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The ‘Knowledge’ in *Knowledge Economy*

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Abstract

The conceptual apparatus at our disposal to describe the *knowledge* dimension of the notion of “knowledge economy” is hugely underdeveloped. This is in part because the phenomenon is new but predominantly because the attempts in this regard fall back on either the truth paradigm or the utility paradigm within which discourse in connection with the notion of knowledge have traditionally been conducted. It is contended that the knowledge economy is more than mere extensions of either or both knowledge traditions.

It is argued that knowledge becomes ‘visible’ to the human mind only when it takes form in memory, and that memory banks are established in various dimensions of social existence. To understand the knowledge economy better, and indeed the ‘knowledge’ in the knowledge economy, the mapping of the profile of memory is proposed. From that vantage point knowledge in the knowledge economy is seen to reside in codified, embodied and embedded symbols.

Some conclusions about the notion of knowledge in the knowledge economy are drawn.

Keywords: Knowledge economy, memory bank, symbolisation, embedded knowledge, complexity

1 Introduction

The aim of this paper is to present a typology of knowledge which will enhance our conceptual apparatus – and thus analytical ability – in respect of knowledge in the contemporary economic era. The paper, therefore, does not focus on knowledge as such but is limited to the question of what

‘knowledge’ could mean in the composite of ‘knowledge economy’.

The point of departure is the axiom that the vocabulary of knowledge at our disposal at present, although useful, is not adequate to describe the phenomenon of knowledge in the knowledge economy. If this point of departure is contested, the competing range of knowledge concepts in the field of Knowledge Management, as well as the mission statement of the School of Knowledge Science at JAIST may be called in as evidence.

Implied in the above is another axiom.

It is that the notion of a “knowledge economy” indeed resonates with a dominant phenomenon in the contemporary and future world economy, and indeed describes a distinctive economic constellation (as opposed to variation). If this point is contested, the official position of the European Union should suffice as evidence. But it must be conceded that to date very little of substance has been produced in academic circles to illuminate the phenomenon.

If the above axioms may be taken as read, it should be clear that the knowledge economy brings with it objective conditions of production and consumption which necessitate conceptions of knowledge beyond the traditional. The almost universal consensus about the need for innovation and knowledge creation, the by now almost ritual endorsement of ‘lifelong learning’ and, indeed, the emergence of the field of Knowledge Management attest to this.

Yet, although the objective conditions have changed, in the practical discourses of management and its derivatives, knowledge is still conceptualised predominantly on the basis of gnoseologies developed over the past 500 years (with roots going back to over 4 000 years). In fact, a great deal of the unease around the notion of knowledge that we have observed over the past decade or two in the worlds of management and education (if not

more), results from the attempts to fit the knowledge requirements as experienced in and by knowledge intensive societies and organisations into traditional knowledge theories.

Let us then start this paper with a cursory analysis of the reasons for the unease and misfit. That will allow us to propose an enhanced frame of reference on which to build a typology which may allow us better to visualise the economic and knowledge realities we face.

2 Memory and the Paradigmatic Filter

Pity the one who wants to write the history of knowledge, for such a history will have to be almost equal to a description of all human activities.

Knowledge and action go together. And action is life. It is simply impossible, therefore, to conceptualise knowledge as a phenomenon in any other than a dynamic way. And it is virtually impossible to separate the knowledge dynamic from the dynamic of life. No one understood this better than GWF Hegel.

The question how to define knowledge is, however, not the same question as how human beings *access* it. How we know knowledge is a question in its own right, and in fact this – the epistemic – question dominates most intellectual reflections on knowledge. Let us formulate this in a way which will take this paper forward.

In the same way as we cannot see light particles unless they are caught up in an object (such as the retina), we cannot know knowledge in its dynamic state. The dynamic of knowledge has to be ‘caught up’ before it becomes ‘visible’ to the human cognitive eye. In the same way as the dynamic of movement of light particles is suspended when a particle is captured in an object, knowledge is transferred out of the state of dynamism and thus suspended in a state which allows the human epistemic ability to function.

The notion of ‘knowledge’, therefore, becomes a *logical* tool only when we *reduce* it to something substantially less than ‘all of life’. This requires a profound process of selection. Sensemaking theory has shown quite convincingly that the selection process

consists of two activities. First the human mind chops the flow of things into moments or events, and secondly such events are constantly sorted into two categories – those that are to be retained and those that are to be left to subside in the unknown[1]. The constant activity of deciding what to forget and what to remember is an act of creativity of the highest order.

The outcome of this activity is the phenomenon of memory. Memory has very little to do with building a repository of the past. The function of memory is not to capture as much of lived experience as possible – before it is forgotten. Yes, memory can only be constructed from (selective) moments of experience – and in that sense it is rooted in the past – but it is not an activity which preserves the past. Memory is the activity of selecting those snippets of experienced life which we deem essential enough to invest energy and action into to *keep it from becoming the past*. Memories are the life moments reaped from past experience on which we intend to build the future. Memory is the seed reaped from the past to be sown in future.

It follows that memory is, for all intents and purposes, the archetype of knowledge in the epistemic mode. Or to be a bit more circumspect in the formulation: the knowledge that we want to invest in our economic activities, may be equated with the content of our memory.

The effort to keep and maintain such memory is one of the hallmarks of the past few centuries. Because memory is in essence future orientated we need to build memory banks from which to draw when the time is right. It is not for nothing that teaching curricula primarily comprise the history of classics (authors and writings) in a particular discipline. It is in such memory banks that dynamic knowledge is ‘caught up’ and made visible – and thus also communicable.²

The active determination of memory is not an ad hoc process. It takes place within paradigms[3] without which the function of filtering is impossible. Such paradigms function at the individual level, but if large scale incomprehension is to be avoided, they have to be closely related to a mega-paradigm.

2.1 Memory and Truth

If we zoom out from the individual level, it quickly becomes clear that one mega-paradigm has dominated the world of European reflection on the topic of knowledge over most of the past 500 years[4]. This is the notion of truth – more precisely, the *search for truth*.

The definition of truth was always hugely contested, of course. In the beginning it was sought in religious realms, but as time went by, modern science gradually took over as the tour leader on the route to the discovery of truth. In fact, for a large part of the time since the court case against Galileo Galilei, the debate about truth was closely linked to an often bloody polemic between religion and science. It was only when geography, biology and physics matured at the beginning of the 20th century that science became to be accepted as the undisputed arbiter in matters truth, and pure knowledge became associated with the laws of the universe as explicated by science. This in turn fuelled extensive reflection on the nature of scientific knowledge. Today we have inherited a massive literature in this field.

Some of the outcomes of the philosophical work on scientific knowledge have made their way into the discourses on knowledge in the knowledge economy. An example is the influential work by Nonaka and the debate engendered by his appropriation of the notions of ‘tacit’ and explicit’ knowledge from the philosophy of science of Michael Polanyi. [5]

But there is an inherent restriction to the descriptive utility of a recourse to such conceptualisations of knowledge. Put simply: the focus of the philosophy of science is less on knowledge and more on science. This is a specialised discourse for a specialised (and small) group of people. In its essence it is self referential discourse, which cannot simply be extended to all of the knowledge activities of daily existence. The memory bank of science is ring-fenced by self proclaimed access rules that effectively exclude most people. It is not the memory bank to which ordinary people, and even less so business people, take recourse as a matter of habit.

In essence the scientific mind does not fit easily into the contemporary economic system

either. It is driven, after all, by the ultimate desire to find the truth. But that requires endless patience and experimentation – and time. At the end of this a ‘verified’ item of knowledge is added to the memory bank. Despite the amazing number of entries we have in this bank today, such truths make up only a fraction of the knowledge which functions at any given moment.

2.2 Memory and Utility

As applications of science in Europe started to be adapted to applications in daily life, and industrial society was born some 250 years ago, an alternative paradigmatic filter slowly emerged. It is the paradigm of *utility and value*. [6] The initial proponents were Locke, Smith, Mills, Marx and since then a host of people collectively categorised under a very broadly spread umbrella of ‘economics’.

Unlike the truth paradigm the economic tradition was – until recently[7] - not concerned with the nature of knowledge. Rather the focus was (and largely still is) on transient acts such as services and the production and consumption of goods. The processes associated with these are not assessed primarily on their accuracy and veracity, but on their efficiency and efficacy.

This, however, does not mean an absence of knowledge consciousness and memory banks. The shift from truth to utility is at the same time a shift to techn-ology (from the Greek: τεχνη + λογος). Techn-ology is the intellectual reflection on techniques and the interface with objects that require techniques to operate them. In short it is a shift to *skill* (as opposed to episteme) as being the primary cognitive activity associated with knowledge.

The memory banks built up on this basis are clearly not as stable as those that claim to be truth based. As practices change, skills have to change. And much of the memory resides in people tacitly in any case. Yet it cannot be denied that individual and collective technical memory has grown over the past two centuries to a level of sophistication which was probably not credible in the beginning. Of course most of this may be found in manuals but who reads them? There is a huge difference between reading about time management and shaping your own time schedules, for instance. The

first is fiction, the second is knowledge – and thus empowering.

Thus the memory banks of techn-ology are fragile. They cannot be formally taught, but are acquired through exposure to and reflection on the world of utility. They are nevertheless powerful memory banks, and in contrast to the memory banks of (scientific) truth, in principle accessible to all.

But as with the knowledge made visible within the paradigm of (scientific) truth, the memory bank of utility is restricted. This time round the restriction comes with the unavoidable contingency of skills and the transience of activities driven by utility concerns. As a proportion of knowledge which functions at any given moment, skills applications probably make up the major part. But unlike scientifically verified knowledge most skills activities are not replicable. It remains a once off performance.

Logically it will be very difficult to build a conceptual framework with respect to 'knowledge' in the 'knowledge economy' on this. The knowledge in the knowledge economy is certainly more than the sum total of the skills behaviour of all participants.

It would seem that the general, but implicit, assumption up to now has been to view the knowledge economy as the combination of scientific and techn-ological knowledge. This may be correct to some extent, but only when we realise that the sum is more than the components. To comprehend this we need another paradigm that will encompass both the truth and utility paradigms.

This is to be outlined in the following part of this paper.

3 The Landscape of Memory in the Knowledge Economy

The truth and utility paradigms are not mutually exclusive. In the confluence of science and production in the industrial (and now post industrial) society, they are the two constituent knowledge pillars of the socio-economic order.

But in terms of their knowledge contents, they are different. What is to be memorised if the first question is truth, certainly differs from the memory needs when utility is the first

question. It is no coincidence that business and academia find themselves in a rather uneasy relationship. The account of (science driven) memories and their construction in the academic world do not resonate automatically with the memories that are constructed in the world of business – and vice versa.

Up to now, very little of a discourse between the two paradigms has taken place. In fact until very recently it was not needed. In the industrial economy knowledge plays a very important role, but it remains an adjunct to the production process. Without exact knowledge of, say, the chemical reactions in a cylinder of a combustion engine, the engine will not work. But once such knowledge has been discovered and built into the engine, knowledge ceases to be a production factor. From then on the engine runs on its own. Specific knowledge is crucial – but only up to a point. Knowledge is a necessary precondition, but not the focus.

In the knowledge economy, however, we see for the first time an economic and social constellation where the core of the economic activity consists in the processing and production of knowledge. This is, of course, dramatically enhanced through the almost revolutionary increase in knowledge technologies (read: computing) over the past few decades. But it must be understood that the knowledge economy is not generated or even defined by these technologies. The reverse holds: the need and market for such technologies arose because the economic system has entered a stage in which the *primary product and production factor* is knowledge.

This point is crucial. It casually states a major evolutionary jump in the history of humanity. Until now, knowledge – as important as it may have been – was only *one of* the factors shaping our existence. In the knowledge economy it is the pivotal factor. Previously it was one of the adjuncts, now it is the starting and focal point.

This is the fundamental reason why describing the knowledge economy in terms of the memory banks of truth and utility is not adequate. As important as they may be, they represent only two memory banks. But there are more.

We need a picture of the total landscape of memory banks that make up the knowledge

economy. To formulate this in terms of a question: where in the knowledge economy do we have to look if we want to locate knowledge? And in what modes will knowledge present itself?

3.1 Knowledge and Symbol

It is unfortunate – although understandable in the light of the history of the last 500 years – that the discourses on knowledge have largely (and in the context of Knowledge Management and the Knowledge Economy almost entirely) ignored insights from classical linguistics, rhetoric and hermeneutics. In so doing a rather elementary, yet very useful, insight has not been explored. That is the *symbolic* nature of known knowledge.

The word ‘symbol’ (συμβολον) is closely related to ‘signa’ (σιγνα) – both being of classical Greek origin. The latter, still present today in the word “signature”, expresses a phenomenon as strange today as it was in classical Greece. That is the phenomenon of an agent to have the ability to be physically absent, yet effectively present by virtue of some form of representation which may be equated with the agent itself. Symbols are the forms in which such representations exist.

It is this ontological reality on which human communications rest. It is our ability to extend our identities through symbolic extension, and our ability to respond to the symbolic extensions of others that enables us to see and understand the world. The mediation of ideas does not take place outside the realm of symbolisation. If we are going to look around for knowledge, we have to learn to read the appropriate symbols. Let us, therefore, explore the formats of symbolisation further.

It is proposed here that the memory banks of the knowledge economy are to be found in three areas of symbolisation. Let us outline them.

3.2 Symbolisation as Codification

The primary form of symbolisation is *codification*. As humanity developed its competence to symbolise, systems of notation grew. Until the industrial era, the ability to use

such systems of notation was limited to the very few. But the industrial era was not possible without large numbers of people acquiring the skills of letters and (later) numbers. At the same time social and physical infrastructures to deliver people of letters and numbers (such as schools and printers) were created. Compared to the previous thousands of years of human history, the growth of human skills in codification over the past 200 years is staggering. And in the last few decades the increase in complexity – in codification – has been even more staggering as electronic codification became more and more ubiquitous.

Probably the greatest human leap forward in respect of codification is in progress at the moment. Since the printing press was popularised, codification has always been unimodal. One either wrote, or calculated, or made a picture, but these were separate activities of codification. Electronic media, however, make immediate crossovers possible. A computer is a multimodal instrument, and as a consequence multimedia is quickly becoming the standard format of codification. Witness the extraordinary uptake of facilities such as Facebook and YouTube.

Because of its very nature codification is the primary means to commit that knowledge to memory which is intended to be used for future instruction – either in formal learning processes or in organisational and societal maintenance. The ultimate symbol of codified knowledge until recently was the library (by now almost overtaken by the data warehouse). And for a long time knowledgeable people were those who were drenched most in the reading material contained in the libraries. For all and sundry it was clear where knowledge was to be found. Combined with the seats of learning, such as universities, it was also clear what the codified knowledge meant.

This is no longer the case in the knowledge economy. Knowledge has ‘escaped’ from a single location in the universe of society. In fact codified knowledge cannot be seen any more as the primary form of knowledge. Codification may soon be equated with archiving.

To understand the relative slide in the importance of codified memory banks we have

to look at the other two types of knowledge symbolisation.

3.3 Symbolisation as Embodiment

Much older than codified symbolisation is *embodied symbolisation*. In its simplest version, embodied symbolisation may be equated with culture, provided it is understood in the sense of ‘cultivation’ (and not in the sense of tourist brochure hype). Embodied symbolisation refers to those memories that have become collectively standardised in a community and are expressed in oral and musical traditions, generally accepted norms of conduct and assumed legal frameworks.

Remarkably the importance of embodied symbolisation is increased in the knowledge economy. It is reflected in notions such as “best practices” and underlie much of the attempts to convert ‘tacit’ to ‘explicit’ (read: codified) knowledge.

Embodied knowledge gains in significance in the context of the knowledge economy because of the pace of adaptation required to compete. Codification is laborious and slow, and more importantly, it freezes knowledge in a state of immutable memory. In a fast moving context this is counterproductive. Instead flexibility is required, and that can only be achieved if conditions exist in the organisation which allows for individual spontaneity on the one hand, and continuity with the objectives of the organisation on the other hand. This is very often referred to as the ‘culture’ of the organisation and minimalistically expressed in terms of values.

In the industrial economy the production process depended on the skill of the labourer when applied to the mechanical workings of the machine. In the knowledge economy the labourer is displaced by the talented person who operates in relative freedom, employing tacit knowledge in a non-routinised way. Yet the knowledge is not eclectic or accidental. It is tuned to the collective understanding of the community to whom the talented person belongs, and with whom he or she constantly converses in an ongoing learning process. In this mode knowledge is symbolised through role enactment and cultural propagation.

3.4 Symbolisation as Embedding

The third form of knowledge memory is *embedded symbolisation*. This form of symbolisation sets the industrial and post industrial economic era firmly apart from any other and previous era.

For ages human beings have expressed their knowledge in codified and embodied forms. This means that a direct and total relationship between the human being and a particular symbolisation existed. This is particularly significant in respect of the use of tools. A spade, a fork, a pen, indeed any tool were instruments of productivity only as long as they were in the hands of an active human being. The physical energy and presence of a human being was the sine qua non for any form of productivity.

What sets the industrial era (and thereafter) apart is the ability which grew as time progressed to *permanently transfer* knowledge into physical objects, thereby endowing them with some capacity to perform actions independent of direct and constant human directives. Rather than writing knowledge down in codified format, the inventors of early industrialisation and beyond symbolised their ideas in the construction of physical objects. What turned these from art to machines was the ability to invent ways to infuse non-human forms of energy into the objects. Thus “life” was given to inanimate objects. The era of machine automation had begun.

The knowledge invested in machines is invariably scientific in origin. For that reason it is not necessarily popularly understood. But in the same way as basically literate people can read a document without necessarily understanding the philosophical undertones, a machine can be used by most without understanding the mathematics involved – for instance. If the relevant knowledge is properly embedded in the construction and operation of the machine the person who works with that machine may in principle be illiterate. All that is required is a set of behavioural skills that conform to the operation of the machine. In this way machines represent an almost total transfer of knowledge away from human beings into physical objects.

The story of embedded knowledge symbolisation (machines) is a fairy tale. In the

early stages machines were flimsy adjuncts to normal production processes which were obviously highly human intensive. From there machines grew in two ways. Over time, refinement brought about more effective, faster, less noisy, less energy consuming, less polluting – in short, more productive machines. Each round of refinement comes on the back of new rounds of scientific insight and innovation. The Ford of today is still a car, but incomparably more efficient and comfortable than the Model T of 80 years ago. But this is a result only of the accumulation of embedded knowledge over time.

From this point of view, it is entirely plausible to see categories of machines as banks, in physical format, of memory - in particular scientific, but also operational memory.

The second way in which machines grew is through networking. Initially machines congregated in certain locations around the world, and it did not take long before mutually dependent systems of different machines developed. (Steam engines generate electricity, which makes movies possible, which spurs on lifestyle magazines, etc). Gradually such centres established interconnections and since the advent of the electronic media, a global interconnectedness is in the making.

It is this interconnectedness that fuels the information revolution. Where isolated machines needed energy to perform automated functions, the interconnected machine can be made productive only in comparison to other machines elsewhere in the world, and to achieve that a massive flow of information is required. This flow of information is particularly visible in the global financial systems.

In the last two decades the systemic nature of embedded knowledge has entered a new phase. As computing becomes more powerful, the actual interface between embedded knowledge systems is more and more managed by computers. This means that not only the nodal points of the production systems but also the relationships between them are increasingly automated. In this instance automated does not mean routinised. Popular and business computing is already in a position to automate decision-making to some degree.

The automation – and autonomisation to some degree – of systems interfaces, of the systems of systems, marks the birth of a new type of memory. It is the memory of dynamics as opposed to ‘facts’ or data. To some extent it can be viewed as the impersonal version of embodied symbolisation. The only form of human language at our disposal to describe this memory ‘bank’ is the language of complexity.

4 Some Conclusions

Let us now draw some conclusions from the above exposition.

One: the notion of knowledge should not be assumed to refer to or describe a monomorphous phenomenon. In its dynamic state knowledge is a dynamic and for that reason amorphous. In its ‘visible’ state it is symbolised in many memories.

Two: what sets knowledge in the knowledge economy apart from knowledge in other economic constellations is that knowledge, in this case, is physically embedded and systemically automated. As such it is not confined to being an adjunct to an existence which is entirely capable to continue on its own without any specific knowledge intervention. In this case existence depends on the activity of knowledge.

Three: the physicalisation of knowledge means that, for the first time in human history, knowledge is capable of performance outside of direct human intervention. This means that systems of knowledge interfaces now exist which create the context for human life, and not the other way round.

Four: if we want to detect the localities of knowledge we best do so by following the symbols of knowledge in the various dimensions of existence. In doing so we find knowledge in three macro types: codified, embodied and embedded.

Five: we live in a knowledge economy today because each of the above dimensions have grown memory banks of enormous size, and our productive capacity today depends on the utilisation of the knowledge in them. In fact we live inside our memory banks!

References

- [1] For an advanced exposition of sense-making theory, see Karl E Weick. 1995. *Sensemaking in Organizations*. SAGE. This work is continued by Haridimos Tsoukas. 2005. *Complex Knowledge – Studies in Organizational Epistemology*. Oxford University Press.
 - [2] In sense-making theory this is known as ‘retrospective coherence’. Memory is constructed after the event, and then also selectively. It follows that different memories of the same objective event are not only possible, but usually constructed. A great deal of all polemics is rooted in the actual clash of retrospective coherences. The coherence is achieved only at the level of the individual, and very rarely at the collective level. In most cases the only way that collectives can deal with the clash of memory is through mechanisms of authoritative power.
 - [3] The concept of “paradigm” is used here in a way that approximates Thomas Kuhn’s notion as summarised in Bird, Alexander. Fall 2007. *The Stanford Encyclopaedia of Philosophy*.
<http://plato.stanford.edu/archives/fall2007/entries/thomas-kuhn/>
 - [4] For the purpose of this paper I focus only on Europe. This choice is not eclectic.
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- Despite many factors (such as numeracy and mathematics - necessary to create an industrial economic order) being of non-European origin, the historical reality is that the economic system which dominates the world today germinated and developed in Europe over the past 500 years. It was only in the latter part of this period that Europe exported itself into some other areas of the world. It is therefore not surprising that most of the classical writings on this phenomenon come from the European intellectual traditions.
- [5] Nonaka’s definition of knowledge as being justified true belief draws clearly on this tradition and so does his by now famous uptake of the Polanyi concepts of “explicit” and “tacit” knowledge.
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