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KNOWLEDGE MANAGEMENT IN THE INFORMAL SECTOR

A REVIEW OF KENYA'S JUA KALI INDUSTRY

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Abstract

The knowledge revolution has prompted increased focus on the role of knowledge in enhancing the sustainability and competitiveness of businesses in what has been termed the 'knowledge era'. Extant literature evidence that substantial scholarly interest geared towards understanding how organizations manage their knowledge assets to improve their capability portfolio in a high velocity knowledge economy. This paper is based on a survey of knowledge management practices and techniques in Kenya's informal jua kali sector. The survey focused on four knowledge management practices identified from extensive review of extant literature: knowledge creation, knowledge sharing, knowledge retention and protection, and knowledge application; and interrogated their relevance in the sector. Specifically, the study targeted jua kali metal fabricators operating in fixed business premises in Kenya's urban areas and engaged 194 artisans drawn from across the country's geography. Data was collected by use of a questionnaire complemented with observation. Results revealed that there are informal knowledge management practices among the jua kali. Additionally, results underscored reverse-engineering and trial and error as the primary knowledge creation activities in the sector. Clients and jua kali fora including exhibitions, workshops and seminars typify the agents and channels through which new ideas filter to jua kali artisans. Knowledge application is characterized by drawing sketches and modeling, while Knowledge preservation is largely defined by photography. Knowledge retention and protection were however found to be atypical of the jua kali sector. Protection was found to be grossly constrained by jua kali mode of operation. In nutshell, scarcity of resources and capital constraints were found to be significant impediments to KM in the sector. This study recommends that a focus on knowledge and KM in the sector takes cognizance of jua kali mode of operation, resource availability and capital accumulation.

Keywords: Jua kali- Kenya, knowledge management, informal sector, sustainability

INTRODUCTION

At the very outset, this paper reflects on the concept of knowledge as conceptualized in knowledge and knowledge management literature. Further on, it synthesizes the knowledge management process, as depicted in extant literature largely drawn from the domain of knowledge management. An exploratory review of the typical knowledge management activities and techniques in Kenya's informal sector is then made with particular focus on the manufacturing subsector.

The Concept of Knowledge

Research and scholarly interest in the concept of knowledge has a long history that cuts across a wide range of disciplines; and though the influence of knowledge on human existence has arguably remained uncontested, its definition and conceptualization have proven a protracted enigma in spite of the increasing interest it has generated, particularly in the past few decades. A review of literature exposes a rich and divergent debate amongst the social scientists to the extent that knowledge has been termed an obscure concept (Tsoukas &Vladimirou, 2005; Alvesson, 2004; Hunt, 2003; Robinson, 1971). The aim here, however, is not to join in the seemingly unrelenting debate into the property of knowledge, but rather, to review previous works on knowledge as conceptualized in knowledge and knowledge management literature, with the main of aim of developing a working definition of the concept.

A Multiple Reality of Knowledge

Amidst the divergent definitions and conceptualizations of knowledge in knowledge and KM literature is a manifest consensus among scholars that knowledge is an invisible and intangible abstraction that subsists in the faculties of the human mind, and that is solely perceptible from its presumed effect on behavior (Berkeley, 1710; Hunt, 2003; Wiig, 1999; & Al-Dujaili, 2012). It has invariably also been conceived as a might: a causative and enabling factor (Hislop , 2013; Becerra-Fernandez & Leidner, 2008; Wiig, 1999), existing in the minds of people in the form of mental models, scripts, schema (Wiig , 1999) and frameworks (Alvesson, 2004) detectible in, and shaping reasoning, analysis, interpretation, understanding and action.

Literature further reveals that knowledge is a composite of human attributes. This being the case, a fraction of the scholarly community in research on knowledge and KM has tended to avoid single term definitions, in preference for elaborate definitions that capture both the complexity and multifaceted nature of the concept. Certain facets are particularly conspicuous in definitions and conceptualization of knowledge. Examples are facts, truths, beliefs, perspectives, knowhow, patents, intellectual capital, premises, rules, methodologies,

competencies, structures, experiences, skills, insights, relationships, values, norms, judgment, reflections, ability, potential, capacity and mental state (Becerra-Fernandez & Leidner, 2008; Aldujaili, 2012; Wiig , 1999; Hunt, 2003; Sveiby, 2001; Bernard & Tichkiewitch, 2008; Nonaka &Takeuchi, 1995; Krogh, 2000; Robinson, 1971; Firey, 1999; Little and Ray, 2005).

A classical model of knowledge as a moral property that impels behavior is also typical of a teleology of knowledge depicted in knowledge and KM literature (Wiig, 1999; Swan & Scarbrough, 2001), vis-à-vis episteme: open-ended quest for knowledge as conceived by Theocharis (http//itis.volta.alessandro.it. /episteme/ep4th1.htm;) and Baumard (2001). Becerra-Fernandez & Leidner (2008), for instance, define knowledge as an organized structure of facts, relationships, experiences, skills and insights that produces capacity for action. Similarly, Al-Dujaili (2012) views it as a fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information, while Hunt (ibid) conceives it as a characteristic of a person that influences their behavioural potential.

Whatever knowledge is, therefore, whether a characteristic of a person (Hunt 2003), a state of being (Robinson, 1971), a disposition, an entity that people possess (Hislop, 2013) or an amalgamation of facets (Al-Dujaili, 2012; & Becerra-Fernandez & Leidner, 2008), it is evident that knowledge endows the possessor attributes: potential, disposition, ability and capacity that bear upon their behavioral tendencies. For this reason, knowledge has typically been acclaimed the clue to ones current and future performance (Alvesson, 2004; Hunt, 2003; Delgado, 2011).

Additionally, commonly accepted facets and proxies of knowledge have also been popularly adopted as reliable predictive indicators/signals of capacity for performance (Toner, 2011). It should further be noted that a number of scholars define knowledge as a capacity, capability or ability. Sveiby (2001), for instance, defines it as a capacity to act; Wiig (1999), as the ability to understand and act effectively; while Tsoukas and Vladimiriou (2005) liken it to the individual's capability to draw distinctions, within a domain of actions, based on appreciation of either context or theory, or both.

Another insight into the nature of knowledge is provided by the traditional Greek definition of knowledge as a justified true belief (Takeuchi, 2013; Becerra-Fernandez & Leidner, 2008; Wallace, 2007; & Hunt, 2003). Immanent in this definition is the need for justification for any knowledge claim. Such a claim ideally needs to be supported with evidence since knowledge is itself proposed to be a product of some justificatory relationship (Hintikka, 2014; Takeuchi, 2013; Mesny, 1998; & Hunt, 2003). Again, it has to demonstrate logic in common with prevailing world views. Such philosophy twines with Anthony Giddens' theory of reflexive modernity which proposes that human beings typically appropriate, reorganize and restructure

knowledge claims in the context of their day to day life (Mesney, 1998; Beck, 2009; & Crowley, 2012). Truth, according to Mesny (ibid) needs to meet the requirements of certainty - it is hard if not impossible to refute; evidence- it is based on something ; practicality- it has to actually work in the real world; and broad agreement- lots of people have to agree that it is true. Moreover, extant literature documents that knowledge is always in a certain sense collective and that the validation of knowledge components is a social process (Nonaka, 1991; Nonaka 1994; Eisenhardt & Santos, 2000; Servin, 2005; Becerra-Fernandez & Leidner, 2008; Mesney, 1998; Beck, 2009; Crowley, 2012; & Tekauchi, 2013). In concordance with these views, a definition of knowledge in this write-up aims at incorporating and integrating all accepted facets of knowledge in the world of the jua kali.

An additional convergence of perspectives in the conceptualization of knowledge is the transient nature of knowledge (Mesny, 1998; Eisenhardt & Santos, 2000; Becerra-Fernandez & Leidner, 2008; & Jawadeker, 2011). Scholars across disciplines recognize the infinite vista of knowledge, on account of the boundlessness of human cognition. Becerra-Fernandez & Leidner (2008) for instance, observe that knowledge is always provisional as an aggregate, whether in the human mind, a technical handbook, as an organizational knowledge base or in a science, and that in a nutshell, we do not know what we do not know. Every day is marked by intellectual advances, new discoveries and additional experiences. Consequently, new knowledge is constantly being created; the existing augmented, complemented, revised, rejected or obliterated altogether.

The Boundary of Knowledge

In spite of the evident consensus on the complexity of the notion of knowledge however, extant literature exposes a departure in viewpoint particularly with regard to the boundary of knowledge (Takeuchi, 2013; Crowley, 2012; Hunt, 2003; & Evans & Easterby-Smith, n.d) and what a number of scholars perceive as profiling of knowledge in a way that privileges, and by default, subordinates certain, albeit agreed-upon facets of knowledge (Hislop, 2013 & Crowley 2012). Concerning the latter for instance, Nonaka (1991) reports a prevalent misunderstanding of the concept of knowledge and takes note of a tendency, particularly among western thinkers, to confine knowledge to the formal, systematic and codified procedures and universal principles. Prevalent metrics for knowledge assessment are equally formal and explicit (Nonaka, 1991 & Hunt, 2003).

Similarly, Baumard (2001), Hislop (2013) and Takeuchi (2013) report a typical tendency to either implicitly or explicitly privilege abstract/ theoretical knowledge in the mainstream conceptualization of knowledge work. Hislop (2013) for instance, notes that the term knowledge

has invariably been used with an exclusive group of workers. This, he argues, is not only subjective and arbitrary, but that it has also led to the significance, role and legitimacy of contextual knowledge being downplayed. He conceives knowledge as a variegated construct in which the abstract/ theoretical blends with the contextual to produce a harmonious whole in which none subordinates the other. This is also the view advanced by Nonaka and Takeuchi (1995) and Takeuchi (2013), and which this paper too advances.

The notion of knowledge as a variegated construct fits into the semiotic distinction of knowledge as conceived by Michael Polanyi. Polanyi's thesis continues to dominate KM literature and has given prominence to two knowledge taxonomies: explicit and tacit. Explicit knowledge is perceived as that articulate realm of knowledge that is consciously acquired and that is transmittable in formal systematic language since it is easily coded (Nonaka & Takeuchi, 1995; Jawadekar, 2011; Takeuchi, 2013). It is also popularly referred to as the objective, rational, generalizable and scientific knowledge (Takeuchi, 2013; Evans & Easterby-Smith, ibid).

Tacit knowledge, on the other hand, is the subjective form of knowledge that is embedded in the person of the practitioner. Due to the peculiarity of its existence- in the minds and bodies of its custodians- it is difficult, if not impossible, to disembody, codify and articulate (Nonaka & Takeuchi, 1995; Jawadekar, 2011; Takeuchi, 2013; Hislop, 2013). Unlike the explicit domain, tacit knowledge may be subconsciously acquired and unconsciously employed (Hislop, 2013). Baumard (2001) and Takeuchi (2013) particularly underscore the strategic primacy of tacit knowledge. They argue that strategic success lies more on the ability of top managers to use tacit knowledge than in their gaining or updating explicit knowledge. They are also of the view that explicit knowledge rests upon and integrates with tacit knowledge.

In spite of the wide adoption of Polanyi's semiotic distinction of knowledge, the question of whether tacit and explicit knowledge are analogous to the two sides of a coin (Nonaka & Takeuchi, 1995; Takeuchi, 2013; Jawadekar, 2011); whether they are separate and distinct entities; or whether they reflect two ends of a continuum (Evans & Easterby-Smith, n.d) generates perceptible controversy. My thesis in this paper is that the two are inseparable and complementary parts of the whole as may be inferred from Polanyi's assertion that tacit knowledge can become explicit and that tacit knowledge spurs discovery, which is the foundation of explicit knowledge (Jensen, Richter & Vandelo, 2003). My thesis is also anchored on Nonaka and Takeuchi's SECI model that reflects the interactive process of knowledge creation (Nonaka & Takeuchi, 1995; Jawadekar, 2011; & Takeuchi, 2013). Also of significant contribution to my thesis of multifaceted and complementary knowledge, is Howard Gardner's theory of multiple intelligence, which proposes that people have a unique blend of capabilities

and skills and that people who have an affinity towards one of the intelligences do so in consort with other intelligences as they develop skills to solve problems (Gardner, 2010).

In summary, knowledge is a complex social construct whose property cannot be expressed in single term definitions. In developing a working definition of the construct, this paper adopts a range of the commonly used proxies of knowledge, and its various attributes, as presented in extant literature. Its knowledge catalogue draws from Polanyi's semiotic distinction of knowledge into tacit and explicit form. This catalogue underscores the multiple reality of knowledge and supports the claim that knowledge is never fully manifest and that people express only a fraction of the knowledge they rely on (Baumard, 2001). In a nutshell, an integrative knowledge matrix that reflects both tacit and explicit knowledge comprises general formal education, skills, experience, insights, connoisseurship, hunches, intuition, contextual information, and formal and informal training.

Knowledge Management

The increased focus on KM is rooted on the premise that knowledge and the capability to manage it are the most crucial elements in sustaining or improving organizational performance (Coakes, 2003; Servin, 2005; Hislop, 2013; Mosoti & Masheka, 2010; Becerra-Fernandez & Leidner, 2008; & Mruthyunjaya, 2011). A company's overall performance is often linked to its capacity to mobilize all the knowledge resources held by individuals and teams and to turn these resources into value creating activities (Servin, 2005). Consequently, scholarly interests have typically leaned towards understanding how organizations use knowledge to acquire, exploit and adjust their capability portfolio in a high velocity knowledge economy.

The Knowledge Management Process

Knowledge Management denotes organizational practices aimed at harnessing available knowledge assets to steer value creation. A review of literature exposes a rich repertoire of definitions that depicts not only the process and its various dimensions and media, but also its teleology. A few of these definitions are summarized in table 1.

The idea behind knowledge management, according to Servin (2005), is to establish an environment in which people are encouraged to create, learn, share and use knowledge together for the benefit of the organization and its various stakeholders. This argument is arguably founded on the premise that each one of us is a store of knowledge- with training, experience and informal networks of friends and colleagues, whom we seek out when we want to solve a problem or explore an opportunity (Sveiby, 2005) and that no activity whatsoever can

be carried out without suitably managing all the facets of the relevant knowledge (Hislop, 2013). Consequently, creating, sharing and using knowledge are primary functions of management.

Table 1. Assorted Definitions of Knowledge Management

Source	Definition
Awad & Ghaziri (2007)	The process of capturing and making use of a firm's collective expertise anywhere in the business
Sveiby (2001)	The art of creating value from an organization's intangible assets
Hunt (2003)	The process of creating, selecting, organizing, conserving, disseminating and transferring knowledge to achieve strategic objectives and create value
Becerra-Fernandez & Leidner (2008)	The range of organizational policies and set of practices aimed at organizing, creating, categorizing, maintaining, sharing and applying the collective knowledge of people, assisted by IT.
Mosoti & Masheka (2010)	The process by which firms acquire and apply their own intellectual capital.
Wallace (2007)	The process necessary to capture, codify and transfer knowledge across the organization to achieve competitive advantage.
Servin (2005)	The practice of applying the collective knowledge of the entire workforce to achieve specific organizational goals.

Source: Compiled from the Reviewed Literature

A review of these definitions reveals that knowledge management is a purposeful endeavour: to achieve specific organizational goals (Mosoti & Masheka 2010; & Becerra-Fernandez & Leidner, 2008). Awad and Ghaziri (2007), and Jawadekar (2011) posit that knowledge management is meant to achieve breakthrough in business performance through the synergy of people, processes and technology. Becerra-Fernandez and Leidner report that knowledge management provides numerous benefits including leveraging core business competencies, accelerating innovation, improving decision making, and enhancing employees learning and exposure to the latest knowledge in their field.

Extant literature further underscores the role of technology, culture and leadership in the knowledge management process. Mosoti and Masheka (2010) term these three, enabler factors in the knowledge management practice. They observe that while technology is essential for creation, transfer, documentation and application of knowledge, leadership brings to bear knowledge management practices in an organization through policies and strategies, and by extension, influences the knowledge management culture of an organization or the lack of it. Similarly, in a review of the challenges of the knowledge revolution and increasing global

competition, Zeng (2008) quotes Zeng and Wang (2007) as observing that: With today's global knowledge revolution, firms and industries are rapidly becoming more knowledge-and-technology-intensive; accordingly, their means of production and operation are also becoming increasingly knowledge-based. This requires an increasingly intensive acquisition, adaptation, and use of knowledge and technology throughout to enhance productivity and efficiency (Pp10).

A Framework of the Knowledge Management Process

Typically, Knowledge Management practices vary with the context in which they are implemented (Servin, 2005). Organizational characteristics such as size, calibre of workforce, work processes, and organizational structure often bear upon knowledge management approaches adopted (Hislop, 2013). However, organizational knowledge management can ideally be seen within a framework of four process-sets: creation, retention, sharing and utilization (Becerra-Fernandez & Leidner, 2008; & Harrison, 2003).

Knowledge Creation

Knowledge is born out of human interaction with the environment (Takeuchi, 2013; Nonaka & Takeuchi, 1995; Harrison, 2003; & Becerra-Fernandez & Leidner, 2008). Mosoti and Masheka (2010) note that organizations often obtain knowledge from industrial associations, competitors, clients and suppliers, public research institutions or by ingesting new members who have knowledge the organization didn't already have. Knowledge itself may be the product of R&D, analytical/empirical analysis, chance/unintended discovery, cumulative experience or a combination of a few or all of these variables. Among the objectives of this study was to assess how knowledge is generated in the jua kali industry.

Nonaka and Takeuchi (1995) have argued that organizational knowledge creation, per se, is not an exclusively specialized activit- the province of R&D and scientific experimentation, but rather a way of being in which everyone is a knowledge worker. This being the case, new knowledge always begins with an individual as an insight, intuition, hunch, idea, mental model and know-how, all born of experiential learning. An individual's personal knowledge is then amplified into organizational knowledge through an interactive process (Takeuchi, 2013; & Becerra-Fernandez & Leidner, 2008). In the end, an organization's knowledge is the blend of the views of different people in the organization. A review of the jua kali sector therefore provides a forum for testing the relevance of these theses in the sector.

Knowledge Sharing

Knowledge sharing is responsible for the creation of new knowledge, enrichment and preservation of existing knowledge, and obsolescence of outdated knowledge. These notwithstanding, a number of scholars are of the view that the motivation to share knowledge does not come naturally and that human beings are typically inclined to horde knowledge (Mosoti & Masheka, 2010; & Becerra-Fernandez & Leidner, 2008). Consequently, organizations are often urged to purposefully cultivate and nurture knowledge sharing chiefly because knowledge sharing and collective interpretation, particularly across organizational boundaries, are key to innovation (Becerra-Fernandez & Leidner, 2008; Al-Dujaili, 2012; & Kinyanjui, 2008). Attention is also drawn to the need to improve the absorptive capacity of the organization (Harrison, 2003; Lombardi, 2007; Becerra-Fernandez & Leidner, 2008; World Bank, 2007; & Al-Dujaili, 2012). A common argument has been that what individuals learn is to an extent influenced by what they already know (Kinyanjui, 2008).

In industry, knowledge sharing classically takes the form of formal and informal training, and mentoring. Explicit Knowledge is often articulated and documented in training manuals, lessons learned, good work practices and articles for publications, while plenty of tacit knowledge is shared in exhibitions and open fora. A great number of research reports also note collaboration with stakeholders including suppliers, buyers, research institutions and alliances as important means of knowledge sharing. IT has again been recognized for its facilitative role in knowledge sharing particularly through socio-networking (Becerra-Fernandez & Leidner, 2008).

Knowledge Retention

Retention aims at minimizing loss of organizational knowledge through leakage or attrition. Harrison (2003) observes that though a lot of knowledge exists in an organization, only a small fraction of this is captured and stored. Consequently, as people leave the organization, they take with them valuable knowledge (Switzer, 2008; Mosoti & Masheka, 2010; & Joe et al., 2013). Typically, an organization's tacit knowledge is embodied and retained in routine procedures, norms, rules, value systems and viewpoints. Explicit knowledge on the other hand is documented in reports, best practices, models and lessons learned (Harrison, 2003; & Becerra-Fernandez & Leidner, 2008).

Retention of knowledge is of key interest here particularly because research reports that skills in the jua kali sector have been watered down from generation to generation, and that jua kali machine makers of 1970s were more proficient than today's (Daniels, 2010). Again the Kenya Industry Property Institute (KIPI) has reportedly been unresponsive in terms of offering

legal protection through intellectual property claims to curb the rampant copying of ideas. Precisely, this paper reflects on structures in place to promote knowledge retention in the informal sector.

Knowledge Application

Smith and Glock (1953) on 'Measuring Knowledge and Application, An Experimental Investigation', raised a pertinent question regarding the application of knowledge: "Does the possession of knowledge imply the ability to use that knowledge?" (Pp.327). The advanced view in the current study is that the definition of knowledge as the capacity to act (Sveiby, 2001) merely avers that knowledge equips the possessor. It does not go beyond equipping to subsume the possessor's inclination and decision to use or not to use such endowed capacity. Arguably also, failure to apply knowledge is not tantamount to a knowledge deficiency. Hunt (2003) notes that since knowledge cannot be observed, it can only be inferred from observing performance at a task. Indeed, a common thesis in KM literature is that organizational products, processes and services are congealed knowledge.

METHOD

This study adopted a cross-sectional sample survey design not only to allow for a wider scope while at the same time guaranteeing the manageability of the study, but also to enhance generalizability of the results. Though the term jua kali is today used to refer to all small scale, semi-organized and unregulated business activities, this study focused solely on jua kali metal fabrication industry. Again, due to the informality of the entire jua kali sector and the variant modes of business operations - with some working within recognizable business premises, others in their residences, and a number entirely lacking fixed operation premises -, the survey targeted jua kali artisans operating in fixed business localities in Kenya's urban areas.

Even for this group, there didn't exist an agreed upon population size. Extant literature did not also yield any attempt to disaggregate jua kali entrepreneurs in terms of business activities and population size. Consequently, this study engaged Cochran (1977) formulae for computation of minimum sample size for large and unknown population:

$$n_0 = \frac{z^2(p)(1-p)}{e^2}$$

Where: = minimum sample size; z = z-value for chosen confidence level (in this case 95%); p = population variability (in this case 50% maximum variability for the conservative sample; and e = level of precision (in this case 5%).

Computed thus, the optimum sample size $n_0 = \frac{z^2(p)(1-p)}{e^2} = \frac{1.96^2(0.5)(0.5)}{0.05^2}$ for the target population was 385 artisans. The choice of a conservative sample was based on budgetary constraints this being a self sponsored study and also in view of its geographical scope.

In order to raise the representativeness of the sample, and consequently, the generalizability of the findings, the survey adopted a multi-stage mixed sampling scheme (Kothari, 2004). The first stage entailed stratification of Kenya's major urban areas into cities, municipalities and towns as per the Urban Areas and Cities Act 2011 (GoK, 2011). This was aimed at raising the geographical representativeness of the survey. A sample unit was then purposively drawn from each stratum on the basis of population size. The premise here was that the population of jua kali artisans is proportional to the population size of the urban area. In tandem with this premise, the unit with the highest population was picked.

Subsequently, and in view of the characteristic feature of jua kali artisans in major urban areas to operate in spatial arrangement of clusters, random cluster sampling was employed in urban areas with more than one cluster. Individual respondents were then randomly drawn from each of the sampled clusters using simple random sampling technique. In essence therefore, the total sample units (385) were proportionally distributed among the selected urban areas. Data was then collected using an orally administered questionnaire (in light of the varying literacy levels among the subjects) complemented with discussions for clarification or/and elaboration.

Of the targeted three hundred and eighty five (385) subjects, one hundred and ninety four (194) fully participated in the survey. This reflected about fifty three percent (50.3%) response rate. Non-response was attributed mainly to two factors: data was collected during business hours and a sizeable number of target respondents were hesitant to devote much of their time to the study due to the high opportunity cost; failure to establish contacts with targeted respondents particularly because many artisans are engaged on piece-rate basis and therefore only come to workshops when there is a task to be performed. Survey apathy was also a perceptible factor particularly in the city of Nairobi largely due to overexposure to surveys leading to fatigue. Given these peculiarities, the response distribution, and the margin of error allowed for this study (5%), the response rate was deemed adequate.

Knowledge management was measured using a self developed, twelve items 5- points Likert scale which required the respondents to rate the extent to which they agreed or disagreed that select knowledge management practices and activities were embraced in their workshops. A test of the overall internal consistency of the entire metric yielded a 0.686 Cronbach's alpha coefficient. Since the overall scale was a composite of four subscales (to capture the four

knowledge management processes) a reliability test was also run for each subscale to determine the interrelatedness of the items included. Knowledge creation was measured using three (3) items which particularly focused on modes of idea generation namely: trial and error, reverse engineering, and by fusing together knowledge acquired from various sources including school, internet, friends, and on-the-job learning. This scale yielded an alpha coefficient of 0.534. Knowledge sharing was measured using four (4) items which essentially focused on agents/ fora of transfer/ diffusion of ideas: networks with formal education/ training institutions, jua kali exhibitions, workshops and seminars, peer jua kali artisans, and clients. This obtained an alpha coefficient of 0.428.

The scale for knowledge preservation comprised three (3) indicators which addressed knowledge protection and retention strategies including written records; preservation of physical products, sketches or photographs; and patenting and concealment. The three indicators yielded a 0.304 alpha coefficient. Alpha however rose to 0.477 when the indicator of patents and concealment was omitted. Finally, knowledge application was measured using a two-item scale which wholesomely yielded a 0.514 Cronbach's alpha coefficient. These items were listed as representation of ideas in sketches and making trial products.

On average then, each of the four subscales yielded an alpha coefficient of 0.5. Given the formula for computation of alpha: $\alpha = \frac{N.\bar{c}}{\bar{v}+(N-1).\bar{c}}$ where, N is total number of items; $\bar{C}$the average inter item covariance; and $\bar{v}$the average variance}, and the popular assertion that the number of items in a scale is the principal determinant of the value of alpha, and that fewer number of items typically register comparatively lower alpha values (Kane, 2004; Irving, Warner & Craighead, 2010; & Hatcher & O'Rourke, 2013), a coefficient of 0.5 was considered an adequate indicator of internal consistency. Hatcher and Rourke for instance observe: 'all factors held constant, coefficient alpha will be high to the extent that many items are included in the scale and the items that constitute the scale are highly correlated with one another.' Similarly, Bradley (2013) observes that alpha coefficients can be artificially elevated by including reworded versions of the same item in a scale, which in itself, is tantamount to redundancy.

The construct validity of the entire metric was also tested using exploratory factor analysis (EFA). Quoting Nunally (1978, Pp.112-113), Matsunanga (2010) observes: 'Factor analysis is intimately involved with the question of validity...(and) is at the heart of the measurement of psychological constructs.'

The main goals of EFA were to check for the unidimensionality of the metric in its entirety, unearth the underlying latent structure of the entire data set and to establish the

dimensions between the measured variables and the latent constructs. Focus was given to unidimensionality, multicollinearity, and sampling adequacy for the entire metric. Factor analysis was also aimed at reducing the number of variables used to explain the notions of KM.

Consequently, a principal component analysis (PCA) with orthogonal varimax rotation was carried out, first, to assess the unidimensionality of the constructs being measured and secondly, to reduce the number of items (variables) in the scales to include only critical factors. A fewer number of items was expected to simplify data analysis and interpretation of findings. SPSS output revealed that the composite KM metric was largely unidimensional as each item of the metric was significantly related to at least two others (refer appendix I). A determinant of 0.198 ruled out multicolinearity. Similarly, each item had beyond 40% of shared variance in the latent model. Though weak on average, the measures of sampling adequacy for individual metrics were also acceptable (KMO >.5) { refer to appendix II}.

Table 2. Shared Variance of KM Metrics

Communalities

	Initial	Extraction
Trial and error	1.000	.590
Study dismantle & assemble	1.000	.685
Workshops &seminars	1.000	.695
Photographs	1.000	.579
Model	1.000	.586
Draw sketches	1.000	.541
Clients	1.000	.546
Fusing knowledge	1.000	.468
Networks	1.000	.510
Peers	1.000	.540
Written records	1.000	.427
Protection	1.000	.405

Extraction Method: Principal Component Analysis.

KNOWLEDGE MANAGEMENT MODEL

A principal component analysis (PCA) based on Kaiser Meyer criterion (retain items with eigenvalues > 1 & communalities > 0.5) and with orthogonal varimax rotation extracted four factors from the knowledge management scale, congruent to the four knowledge management processes conceptualized in this study: knowledge creation, KC; knowledge sharing, KS; knowledge application, KA; and knowledge preservation, KP. This was adequately complemented by the extracted scree plot (refer to appendix III) which had four factors with eigenvalues 1. The extracted factors accounted for 54.8 % of the total variance explained by the

model. Based on Kaiser-Meyer-Olkin criterion (KMO), the model had an acceptable, though weak, level of sampling adequacy (KMO=0.586). The Bartlett's test of sphericity was however quite significant { x^2 (21) =137.309 P-value 0.0005<α 0.05}

Table 3. Total Variance Explained by KM Factors

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.485	20.707	20.707	2.485	20.707	20.707	1.810	15.082	15.082
2	1.649	13.740	34.447	1.649	13.740	34.447	1.778	14.813	29.895
3	1.419	11.821	46.269	1.419	11.821	46.269	1.699	14.157	44.052
4	1.020	8.501	54.769	1.020	8.501	54.769	1.286	10.717	54.769
5	.999	8.321	63.090						
6	.930	7.748	70.838						
7	.695	5.793	76.631						
8	.648	5.397	82.028						
9	.624	5.198	87.226						
10	.619	5.162	92.388						
11	.494	4.118	96.505						
12	.419	3.495	100.000						

Extraction Method: Principal Component Analysis.

Table 4. KMO and Bartlett's Test of KM Dimensions

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.586
Bartlett's Test of Sphericity	Approx. Chi-Square	137.309
	Df	21
	Sig.	.000

Guided by extant literature and the weight of the observed variables in defining each of these factors, the factors were labeled as depicted in table 5. Neil (1994) has suggested one factor naming method as the use of the top one or two loading items for each factor.

The rotated component matrix suggested that factor one was mostly defined by practices associated with knowledge creation (KC), factor two by activities that entail demonstration and application of knowledge (KA), factor three by practices associated with preservation(KP) of organizational memory/ideas, and factor four by practices associated with knowledge dissemination and transfer (KS). In the knowledge management model, each of these factors was operationalized by the variable that represented its highest attribute, that is, the one with the highest loading on the factor. Consequently, KC was viewed in light of studying,

dismantling & assembling (re-engineering) of products, KA, in light of modeling; KP, in light of photography; and KS, in light of workshops and seminars.

Table 5. Factor Loadings of the Knowledge Management Scale

Rotated Component Matrix[a]				
Item	**Component**			
	Factor1(KC)	**Factor 2 (KA)**	**Factor3(KP)**	**Factor4(KS)**
Knowledge Creation r=0.534				
Study dismantle & assemble (reengineering)	**.823**	.039	.059	.060
Trial and error	**.724**	.208	.121	-.085
Knowledge Sharing r=0.428				
Clients	-.022	-.120	.409	**.603**
Workshops &seminars	.053	.162	-.018	**.816**
Knowledge Preservation r=0.477				
Photographs	.314	.375	**.580**	.064
Knowledge Application r= 0.514				
Draw sketches	.100	**.660**	.239	-.195
Model	.060	**.754**	.087	.0822

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 6 iterations.

RESULTS AND DISCUSSION

Knowledge Management among the Jua Kali

Knowledge Creation (KC)

As mentioned earlier, the subscale on KC enquired into three modes of idea generation among the fabricators: trial and error; studying, dismantling and assembling imported products; and by fusing together knowledge acquired from various sources including school, internet, friends, and on-the-job learning. The response rates on these three metrics were 95.5%, 99.5% and 99% respectively.

Data obtained revealed that 88% of the respondents generated ideas by fusing together knowledge acquired from various sources, 62% by reverse engineering (studying, dismantling and assembling imported products), and 47% through trial and error. Evidently therefore, jua kali metal fabricators typically generate new ideas by fusing together knowledge acquired from various sources. This notwithstanding, PCA found this mode of idea generation to have minimal relevance in the factor model due to its uniqueness (53%), and excluded it as a dimension of the knowledge creation process among the fabricators. In a nutshell therefore, KC was mostly defined by reverse engineering and through trial and error. This concurs with the findings of Kinyanjui (2008), Daniels (2010), and Nelsen (2012) that underscored reverse- engineering and trial and error as common knowledge creation processes among jua kali innovators. Daniels

observed that jua kali artisans who had previously worked in the formal sector were able to replicate from memory and through trial and error, the advanced machinery they had seen and used in their previous employment. Again, through reverse engineering, they were able to make adaptations of imported tools.

Knowledge Sharing (KS)

The metrics of KS limited themselves to agents/ fora through which new fabrication ideas had filtered to the artisans: networks with formal educational/training institutions, attendance at jua kali exhibitions, workshops and seminars, whether the artisans networked with peer artisans in other workshops, and whether artisan received fabrication ideas from clients. The response rate on these survey items were 100%, 100%, 96.9% and 95.5% respectively.

The findings revealed that though 36% of respondents had networks with formal educational/training institutions, such networks were almost always in the form of students on industrial attachment or students undertaking research. None of the respondents indicated that these networks had brought in any new fabrication idea. Fifty three percent (53%) of the respondents frequently attended jua kali exhibitions, workshops and seminars and confirmed that these fora exposed them to new ideas, designs and techniques. Eighty three percent (83%) of the respondents confirmed that they had received new ideas from their peer jua kali artisans, and ninety percent (90%) confirmed that they had received and put to use new ideas from clients.

Albeit these findings, PCA had, on the basis of shared variance and factor loadings (see tables 6) found workshops and seminars (other fora for tacit knowledge transfer) most illustrative of KS among the artisans.

Table 6. Shared Variance among KS Variables

Variable	Initial	Extraction
Networks with Institutions	1.000	.510
Clients	1.000	.546
Peers	1.000	.540
Workshops &seminars	1.000	**.695**

Extraction Method: Principal Component Analysis.

This echoes earlier observations by Kinyanjui (2008) concerning the Kamukunji metalwork cluster: ‘entrepreneurs take advantage of annual jua kali exhibitions organized by the Ministry of Labor and the Kenya National Federation of Jua Kali Associations (KNFJA)...’

Those who did not attend jua kali exhibitions, seminars and /or workshops cited not being aware of when these fora are organized. Some were not at all aware that such fora were ever organized. A few also cited time as the limiting factor due to the high opportunity cost that, in their assessment, attendance at such fora would attract. This parallels the findings of Daniels (2010) that for the jua kali artisan, : 'every investment in time must produce an immediate return.

Knowledge Preservation (KP)

Knowledge preservation (KP) metrics focused on knowledge protection and retention strategies including written records; preservation of physical products, sketches or photographs; and patenting and concealment. The response rates on the three metrics were 100%, 100% and 99% respectively. Field data revealed that keeping written records was an atypical knowledge retention and preservation strategy among jua kali metal fabricators with sixty eight (68%) of the respondents confirming that they did not keep any written records.

Similarly, jua kali artisans preserved/retained neither models of products nor finished products. Generally ideas were preserved in the form of photographs of notable fabrications made in a given workshop. Seventy five (75%) of the respondents confirmed that they kept photographs. Regarding idea protection, artisans were practically divided between those who protected their ideas (56%) and those who didn't (42%). Two percent (2%) were undecided. The most prevalent mode of knowledge protection was noted to be concealment. Only one respondent confirmed that they had a formal patent.

Those who did not protect their ideas cited the impracticability of concealment in a sector where artisan were largely engaged on piece rate bases and basically moved from one workshop to another, meaning that they would easily become privy to innovation ideas in one workshop and easily disseminate them to other workshops as they moved on. Graduate apprentices would naturally also carry with them innovation ideas that they had learnt from their masters. In addition, these respondents observed that all finished products would ultimately be put on public display thus rendering attempts at concealment futile particularly because in their assessment, acquisition of jua kali fabrication ideas lean heavily towards observing a finished product and trying to come up with a replica of such a product, rather than on conceptualization, comprehension and amalgamation of abstract ideas.

These findings on KP confirm those of previous research in the sector. Kinyanjui, in Zeng (2008), had noted impediments in idea protection since practically all fabrication activities are done in the open. Daniels (2010) had also noted a general dearth of intellectual property protection for novel jua kali fabrications but at the same time observed some attempts at informal intellectual property right protection among the innovators. With regard to knowledge

retention, Daniels had observed that jua kali artisans keep binders of photographs of items that they have produced. Beyond jua kali, Harrison (2003) observes that though a lot of knowledge exists in an organization, only a fraction of it is captured and stored

Knowledge Application (KA)

Measures of knowledge application (KA) principally investigated the extent to which knowledge was put to use. As a prerequisite, the artisans were asked whether they frequently came up with new and original fabrication ideas. The response rate on this survey item was 100%. Nineteen percent (19%) remarked that they did not frequently come up with new and original fabrication ideas, 2% were undecided, and 79% said that they frequently did.

The survey then enquired into whether artisans gave form to their most creative fabrication ideas by drawing sketches, making models, and/or designing finished products. The response rate to these three knowledge application processes were 99%, 99.5% and 97.8% respectively. Data obtained revealed that on average, artisans gave form to their most creative fabrication ideas. Sixty nine percent (69%) drew sketches; sixty two percent (62%) had at some point in time made a model; while sixty eight percent (68%) had made a finished product. Compared to the fraction of the respondents (79%) that confirmed that they regularly came up with new and original fabrication ideas, it was evident that not all new and original fabrication ideas ended up as finished products. Discussions with the respondents singled out capital constraints as a major limitation to the deployment of knowledge particularly in new product development. A few respondents remarked that given their resource constraints, they would not be quick to develop a product whose market uptake they were not even sure about. For such, there was greater solace in fabricating items that were sure to sell in the market.

These findings re-introduce Smith and Glock's (1953) question: 'Does the possession of knowledge imply the ability to use that knowledge?' which is here rephrased: 'Is failure to use knowledge tantamount to a knowledge deficiency?' Clearly, for the jua kali metal fabricator, the answer is no. The findings also bring to fore, the observations made by Nelsen (2012) and Daniels (2010) that among the jua kali, every investment (including the application of knowledge) is expected to provide immediate returns. Daniels for instance observes that in the reality of resource constraints, the risk involved in executing new ideas is tantamount to putting the livelihood of both the jua kali and his family on the line.

SUMMARY AND CONCLUSION

This study examined discernable knowledge management practices in the jua kali sector within a framework of four processes: knowledge creation, knowledge application, knowledge

preservation and knowledge sharing. It established that among the jua kali metal fabricators, new knowledge is mostly created through reverse engineering (studying, dismantling and reassembling imported products or products originating without the jua kali sector) and by trial and error. Trial and error activities were however infrequent due to the perceived costs, both in time and material resources. Other than in the actual fabrication of finished products, artisans give form to their knowledge by drawing sketches of products and by making models. Modeling is however relatively quite infrequent. Knowledge application is wholesomely constrained by resource scarcity, low technology and uncertainty of market availability for new products

With regard to inter-sector knowledge sharing, the study found that new ideas typically filter to jua kali artisans from outside the jua kali sector mainly through clients' specifications. There is very minimal interaction/ linkage between the industry and formal technical institutions. Going by the results of this study, such linkages make no contribution to the knowledge base of the jua kali industry. Within the sector itself, new knowledge filters across clusters via interactive fora including jua kali seminars, exhibitions, workshops and conferences, and regional and national trade fares, all of which draw artisans from diverse backgrounds and localities together. The study however established that hardly any new knowledge, other than the typical jua kali technology and production methods, originates with members of the same cluster.

This study further established that among the jua kali metal fabricators, little effort is made to preserve knowledge. The entire study did not come across an artisan who kept a written record of best practices and/or lessons learnt. None maintained a folder of drawings or sketches of products or processes they had intended to make, made or intended to make. Only a handful kept a dummy of a product they intended to make or made. The most prevalent mode of knowledge documentation was photography. Similarly, little effort is made at protection of intellectual property. Sharing of ideas, copying and imitation are so institutionalized that attempts to conceal and protect ideas bear little fruits. Moreover, their mode of production and operation obstructs any attempt at concealment of ideas.

Additionally, the limited and narrow effort made to preserve knowledge precipitates knowledge loss through natural attrition as artisans leave the sector for whatever reason. This consequently deprives the artisans the opportunity for continuous improvement that could be reaped from learning from their own past mistakes or those of their predecessors; or from propagating proven best practices. Again, the limited interaction with formal manufacturing and technical institutions of learning restricts transfer of new knowledge/ technology essential for steering growth of the sector.

This study thus draws the conclusion that whereas there are KM practices in the jua kali industry, these practices are heavily influenced by resource availability, mode of business

operation, uptake of modern technology and market opportunities for jua kali products. Accordingly, any focus on KM in the sector must take cognizance of these four factors as important intervening variables.

Due to resource constraints and for the purpose of manageability, this study interrogated KM as it relates to the jua kali metal fabrication industry. For a deeper perspective, there is need for research in other sub-sectors that comprise the entire jua kali economy

REFERENCES

Al-Dujaili, A. A. M. (2012). Influence of intellectual capital in the organizational innovation. International Journal of Innovation, Management and Technology. Vol. 3. Pp 128-135.

Alvesson, M. (2004). Knowledge work and knowledge intensive firms. Retrieved D Kärreman, M Alvesson - Organization, 2004 - org.sagepub.com

Awad, M. E. & Ghaziri, M. H. (2007). Knowledge management (2nd ed.). Retrieved from books.google.com/.../Knowledge_Management_2nd_Editi...

Baumard, P. (2001). Tacit knowledge in organizations. Retrieved from www.amazon.com/Tacit-Knowledge-Organizations.../0761...

Becerra-Fernandez, I. & Leidner, D. (2008). Knowledge management: An evolutionary view. Advances in Management Information Systems. Retrieved from www.amazon.com/Knowledge-Management-Evolutionary-Ad...

Beck, U. (2009).Worlds at risk. Retrieved from www.polity.co.uk/book .asp?ref =9780745642000

Berkely, G. B. (1710). Of the principle of human knowledge. Retrieved from https:// www.marxists.org/reference/subject/philosophy/.../berkeley.htm

Bernard, A. & Tichkiewitch, S. (2008). Methods and tools for effective knowledge life-cycle management. DOI: 10,1007/978-3-540-78431-9_27

Bradley, C. (2013). Handbook of psychology and diabetes. A guide to psychology measurement in diabetes research and practice. retrieved from https:// books.google. co.ke/books?id=

Coakes, E. (2003). Knowledge management: Current issues and challenges. Retrieved from www.igi-global.com/.../knowledge-management-current-issues-challenge.

Cochran, G. W. (1977). Sampling techniques (3rd ed.). New York, John Willey & Sons, Inc.

Crowley, J. (2012). Making knowledge work. From social science research to socially reflexive sustainability. Report on Pillar III of the ISSC Climate and Global Environmental Change Design Project. Retrieved from www.worldsocialscience.org/ documents/making-knowledge-work.pdf

Daniel, S. (2010). Making do; Innovation in Kenya's informal sector. Retrieved from books.google.com/.../Making_Do_Innovation_in_Kenya_

Delgado, M. (2011). The role of intellectual capital assets on the radicalness of innovation. Direct and moderating effects. UAM Accenture Working Papers.

Eisenhardt, K. & Santos, M. (2000). Knowledge-based view. A new theory of strategy? DOI. http://dx.doi.org/10.4135/9781848608313.

Evans, N. & Easterby-Smith, M. (n.d): Three types of organizational knowledge: Implications for the tacit-explicit and knowledge creation debates. Paper presented at the Organizational Learning and Knowledge Management: New Directions. DOI: 10.1.1.412.275

Firey, A. T. (1999). Socrates' conception of knowledge and the priority of definition. M.A thesis, Virginia Polytechnic Institute and State University. Retrieved from www.researchgate.net/.../34775795_Socrates'_conception_of_knowledge_a...

Gardner, H. (2010). Multiple intelligences. cochra http://www.howardgardner.com/MI/mi.htm

Harrison, S. J. (2003). Strategic management of resources and relationships: Concepts. USA, John Wiley and Sons Inc.

Hintikka, J. (2014). Knowledge and belief. An introduction to the logic of the two notions. Journal of symbolic Logic, 29(03):132-134. DOI: 10.2307/2271621

Hislop, D. (2013). Knowledge Management in Organizations. A Critical Introduction (3rd ed.). United Kingdom, Oxford University Press.

Hunt, P. D. (2003). The concept of knowledge and how to measure it. Journal of Intellectual Capital, Vol. 4, No. 1, Pp 100-113. Retrieved from http://www.emeraldinsight.com/1469-1930.htm

Irvin, B. Weiner,W. & Craighead, E. (2010): The corsini encyclopaedia of psychology. Retrieved from https://books.google.co.ke/ books?id= pUSG1BON mek C&dq.

Jawadeker, (2011). Knowledge management: Text and cases. Creating a learning organization. Retrieved from books.google.com/... /Knowledge _Management/

Jensen, S. H., Richter, M. L., & Vendelo, T. M. (2003). The Evolution of Scientific Knowledge. Retrieved from www.e-elgar.co.uk/bookentry_main. lasso? id=2963

Joe, C., Yoong, P. and Patel, K. (2013). Knowledge loss when older experts leave knowledge-intensive organizations. Journal of Knowledge Management. 17(6), Pp.913- 927

Kane, L.(2004). Understanding healthcare outcomes research. Retrieved from https://books.google.co.ke/books?id=B7TUbI_HuFIC&dq=

Kenya Law Reports (2011). Laws of Kenya. Urban areas and cities act no.13. Kenya, National Council for Law Reporting. Retrieved from www.kenyalaw.org

Kinyanjui, N. M. (2008). Is Informal Enterprise a Path to Urban Social-Economic Dynamism in Nairobi. International Development Centre Working Paper Series No.4.

Kothari, C. R. (2004). Research methodology: Methods and Techniques. New Delhi, New age International (P) Limited Publishers.

Krogh, G., Ichijo, K. & Nonaka, I. (2000). Enabling knowledge creation. How to unlock the mystery of tacit knowledge and release the power of innovation. Available at www.amazon.com › ... › Knowledge Capital

Little, S. & Ray, T. (2005). Managing Knowledge: An Essential Reader (2nd Ed.). London, Sage Publications Ltd.

Lombardi, M. M. (2007). Authentic learning for the 21st century: An overview. Eli Paper I. EDUCAUSE Learning Initiative. Available at www.educause.edu/Ir /library/pdf/ELI3009.pdf

Matsunaga, M. (2010). How to factor analyse your data right: Do's, Donts, and how-to's. International Journal of psychological Research. Vol.3 (1) Pp. 97-110

Mesny, A. (1998). The appropriation of social science knowledge by 'lay people'. PhD thesis, University of Cambridge. Retrieved from www.irec.net/ upload/File/memoires_et_theses/173.pdf

Mosoti, Z. & Masheka, B (.2010). Knowledge management. The case for Kenya. The Journal of Language, Technology and Entrepreneurship in Africa Vol.2

Mruthyunjaya, H.C. (2011). Knowledge management. Retrieved from www.amazon.com/Knowledge-Management...Mruthyunjay..

Nelsen, T. S. (2012). The jua kali connection:Young professional straddling Nairobi's informal networks-Kamukunji. Retrieved from rudar.ruc.dk/handle/1800/7403

Nonaka, I. (1991). The knowledge creating company. Managing for the long term. Harvard Business Review, November-December Pp 162-171

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. Organization Science, Vol. 5, No.1. pp. 14-37.

Nonaka, I. & Takeuchi, H. (1995).The knowledge creating company. How Japanese companies create the dynamics of innovation. New York, Oxford University Press Inc.

Robinson, R. (1971). The concept of knowledge. Mind, New Series, Vol.80, no.317, 17-28Oxford University Press Inc. Retrieved from http://www. jstor .org /stable/2252334

Servin, G. (2005). Abc of knowledge management. NHS National Library for Health: Knowledge Management Specialist Library. Retrieved from hhttp://www. library.nhs.uk /knowledgemanagement/

Smith, E. D. & Glock, D. M. (1953). Measuring knowledge and application: An experimental investigation. The Journal of Experimental Education Vol. 21. No.4, Pp 327-331. Retrieved from http://www.jstor.org/stable/20153907

Sveiby, K. E. (2001).A knowledge based theory of the firm to guide strategy formulation. Journal of Intellectual Capital. Vol. 2. DOI. http://dx.doi.org/10.1108 /1469193 01104 09651

Sveiby, K. E. (2005). Methods for Measuring Intangible Assets. Retrieved from http://www.sveiby.com/articles/IntangibleMethods.htm

Swan, J. & Scarbrough, H. (2001). Knowledge , purpose and process. Linking knowledge management and innovation. System Sciences, 2001. Proceedings of the 34th International Conference DOI:10.1109/HICSS.2001.926486

Switzer, C. (2008). Time for change. Empowering organizations to succeed in the knowledge economy. Journal of Knowledge Management. VOL. 12 NO. 2 2008, pp. 18-28. DOI: 10.1108/13673270810859488

Takeuchi, H. (2013). Knowledge-based view of strategy. Universia Business Review. cuarto Trimestre ISSN: 1698-5117

The World Bank, (2007). Building knowledge economies. Advanced strategies for development. World Bank Institute, Knowledge for Development Programme, Washington DC. DOI: 10.1596/ 978-0-8213-6957-9

Theo Theocharis (n.d.). What is “episteme”? The meaning of “science” and “truth” Retrieved from http//itis.volta.alessandro.it. /episteme/ep4th1.htm

Toner, P. (2011). Workforce skills and innovation: An overview of major themes in the literature. STI Working Paper Series. Retrieved from http://www.oecd.org /sti/working-papers

Tsoukas, H. & Vladimirou, E. (2005). What is organizational knowledge. In S. Little & T. Ray (eds.), Managing Knowledge: An Essential Reader (2nd Ed.). London, Sage Publications Ltd.

Wallace, P. D. (2007). Knowledge management: Historical and cross disciplinary themes. Retrieved from www.amazon.com › ... › Library & Information Science

Wiig, M. K. (1999). Knowledge management: PDI

Zeng, Z.D.(2008). Knowledge, technology & cluster-based growth in Africa. Findings from 11 Case Studies of Enterprise Clusters in Africa. Available at books.google.co.ke/books?isbn=0821373072