Knowledge Sharing and Business Expertise Factor Relationships

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Abstract: Research into knowledge sharing has predominantly utilised qualitative research methods. The quantitative research methods that built models focused upon a narrow grouping of factors. This research sought to develop a holistic model of the predictors of knowledge sharing, with expertise factors added, to qualify the value of the expertise being shared. An extensive literature review and individual / series of interviews were carried out to identify the knowledge sharing factors, of which 18 were recognised. The value of knowledge shared is dependent on the expertise of the individual, and two expertise orientated factors were developed. These two factors were based upon two self-assessment constructs, a Cochran-Weiss-Shanteau measure, and a peer-comparison measure, both of which were used to identify an individual's the level of expertise. Using these factors a model was developed that, enabled individual self-assessment of knowledge sharing and expertise latent variables. 103 participants completed the survey, and the results were analysed using structured equation modelling (SEM) and confirmatory factor analysis (CFA). The model did not achieve a goodness of fit. There were 6 factors that were significantly related to the intention to share knowledge construct, with both expertise factors found to be significantly related to an expertise construct. The intention to share knowledge construct was significantly related to the expertise construct. This model has been used to identify 4 types of knowledge sharers. These types offer significant practical benefit for human resource activities, specifically in recruitment and organisational design.

Keywords: Cochran-Weiss-Shanteau; Structured Equation Modelling; SEM; Confirmatory Factor Analysis; CFA; Knowledge sharing types; Expertise

1. Introduction

1.1 Purpose Statement

There has been an increase in the research into knowledge sharing. This research has been predominantly qualitative in nature, with many different predictors of knowledge sharing, having been identified.

However, there is currently no tool available that effectively enables either;

1) The holistic identification of the factors leading to an individual's intention to share knowledge.
2) The ability to understand the organisational factors in place that may inhibit or, excite, knowledge sharing.

This research attempts to develop this quantitative tool, which is capable of assessing an individual's intention to share knowledge, as well as, the organisational factors that will influence this.

1.2 Ontological Assumptions:

The author has listed the following ontological assumptions, to demonstrate the impacts of his social-construction of the world, upon the formation of this research.

- Knowledge basing is not a viable sole method of managing knowledge, and needs to be coupled with effective knowledge sharing mechanisms.
- Knowledge sharing has positive relationships with individual and organisational effectiveness/performance.
- Isolated pockets of knowledge reduce organisational effectiveness.
- Knowledge transferring from one actor, to another, is not possible as a simple linear process (i.e. knowledge sharing must occur between actors).
- Proactively sharing knowledge with others will increase individuals' own understanding and knowledge.

1.3 Research Background

Drucker (1957, p.122) coined the term "knowledge worker" which, Cooper (2006, p.59) helped to define as people who are "thinking for a living". This research uses the Cambridge Dictionary definition of a knowledge worker as:

> *"An employee whose job involves developing and using knowledge rather than producing* goods or services:".
>
> Cambridge Dictionaries Online.

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Knowledge increasingly becomes viewed as a commodity with the dawn of the knowledge worker. By the turn of the new millennium, Barth (2000), found that only 20% of workers were devoted to industrial work, the rest being devoted to knowledge work.

In any organization, 90% of the knowledge is embedded and synthesized within employees' heads (Wah, 1999; Bonner, 2000; Lee, 2000).

Fetterhoff & McNamee (2011) identified that knowledge sharing is a top strategic objective for many companies. By encouraging employees to share their useful knowledge, across the organisation, the company can improve and sustain its competitive advantage (Liu and Phillips, 2011). However, Cho et al. (2007) established that individuals do not share as much knowledge as organisations would like.

Therefore, as Salano (2010) contends, the sharing of knowledge leads to increased leads to an increased competitive advantage, and enhanced organisational effectiveness which, it is argued, needs to be sustained, as it is vital for a business to survive.

2. Literature Review

Research in to Knowledge Sharing has typically been differentiated by;

- Approach (quantitative or qualitative)
- Median (Web-blogging to face-to-face – Yuan et al. 2013)
- Industry (Engineering (Lin et al. 2012) and construction workers (Zhang and Ng 2012) to IT workers (Borges 2013))
- In-groups/Out-groups (Nesheim & Hunskaar 2015).
-

However, the practical application of this research is reduced, without defining the criteria that leads to the intention to share knowledge.

Michailove and Minbaeva (2012) identified that, the best way to promote knowledge sharing is, the internalisation of organisational knowledge sharing values. Their research indicated that the organisation can influence internal values to promote knowledge sharing. Kumaraswamy and Chitale (2012), support this idea, with research that showed a collaborative approach to sharing knowledge is achieved through strong communication and discussion, concluding that this is the best way to collectively grow knowledge.

Bautista-Frias et al. (2012) found that utilisation of knowledge mapping, of tacit experts for developing explicit knowledge, such as policies and processes, was effective, but ultimately limited by their focus upon a single academic institution. The qualitative nature of the research meant it was not possible to transfer their findings to other similar institutions, or organisations.

Kennedy et al. (2012) explored individual's impacts on knowledge sharing processes, but failed to address how to assess individuals' likelihood to share their knowledge. Wang and Wang (2012) found tacit knowledge sharing among organisation members, tends to be socially driven. If the sharing of knowledge, considered to be owned by an individual, is driven by sociality, the distinction between intrinsic and extrinsic factors, affecting knowledge sharing, needs to be assessed.

Ryan and O'Connor (2013) found that social interaction was important for tacit knowledge sharing to occur. Therefore, it is likely that there is a correlation between the number of social interactions, and the amount of tacit knowledge that is shared.

Gubbins et al. (2012) researched the tacit knowledge conversion process, and whether the conversion of this knowledge, provided increased value to the business. They found that there are many individual factors are involved in the access, capture, and sharing of, expert knowledge. Conclusions indicate that it is the individual who drives the knowledge sharing process (Busch et al. 2003), and for this reason, the individual's perspective upon knowledge sharing will be considered instead of teams, departments, or whole organisations.

Borges (2013) built a model which, looked at the predictors of knowledge sharing among 143 IT workers. This model was effective at identifying that hardworking, responsible, and introverted employees tend to share their tacit

knowledge, within a supportive environment. The latent variables used, relied on measures, such as the "Big 5", and not the underlying body of literature that this research has undertaken, to develop its' factors.

3. Expertise

The value of expertise to business will initially be discussed and critiqued, as will the approaches that have been employed to measure expertise. These will then be refined, to identify the measures that will be utilised in this research. Since this research is focused solely on "business expertise", other types of expertise will not be discussed.

3.1 Value of Expertise

Experts have better domain specific knowledge then non-experts. The superiority of experts is primarily the result of practice, not innate ability (Ericsson et al. 1993).

> *"Skill learning refers to the gradual improvement of performance with practice that generalises to a range of stimuli with a domain of processing"*
>
> Poldrack et al. (1999, p.208)

Novice problem solvers, through their lack of a rich knowledge base possessed by experts, are more likely to engage in ineffective problem solving strategies e.g. trial and error & unwarranted assumptions etc. (Carr, 2010).

3.2 Measurements of Expertise

Expertise has been extensively researched as a concept (Shanteau et al. 2003; Weiss and Shanteau, 2014; Germain and Tereda, 2012), but there has been no single, agreed, definition, of what constitutes of an expert. The different definitions were explored and evaluated.

3.2.1 Tenure

The number of hours, days or years, working in a particular area, has been linked to expertise. However, the duration of the focus on a domain does not equate to expertise in the domain. There is extensive research that challenges the assumption that, tenure relates to expertise or effectiveness (Costa and Porter, 2003; Wright and Bonett, 2002). For this reason, tenure has not been included, as an expertise factor.

3.2.2 Consensus

Researchers believe that consensus of individuals, is a basis for agreement on the identification of expertise. Therefore, disagreement within the group, of an individual's status, as an expert, means that they are no longer able to be considered as such. This research is based upon self-assessment responses, and therefore this measure is not feasible.

3.2.3 Consistency and Reliability

The level of consistency that an individual exhibits, in answering questions, and the accuracy that they achieve when answering them, has been found to be an effective measure by Cochran-Weiss-Shanteau (CWS – Shanteau et al. 2003). The measure they developed, has been well supported by further research (Weiss and Shanteau, 2014; Witteman et al. 2012; Pauley et al. 2009). Therefore, even though this approach is reliant on a series of domain specific questions, a single question has been devised that will attempt to identify this.

3.2.4 Comparative Domain Expertise (Compared to Peers)

The comparison of an individual, with their peers, is an effective way to identify expertise (McHugh and Lake, 2010). Due to the nature of this research, focusing upon the individual, this measure will be based upon, the self-assessment of business expertise against others in the company.

3.3 Evaluation of Expertise

There have been a multitude of measures proposed to determine expertise, but the lack of agreement of which of these are effective, has made the development of questions relating to this area challenging. The least contested measures have been CWS and Compared to Peers.

The exclusion of other expertise measures, in this research, may restrict the breadth of findings that could be achieved, but this is a deliberate act to reduce the potential negative effect on response rate, as a result of the increased number of questions.

4. Latent variables

There are two latent variables being considered

- Intention to Share Knowledge
- Business Expertise.

4.1 Intention to share knowledge

The intention to share knowledge latent variable is being used by this model to assess the positive correlation, between the intention to share knowledge and knowledge actually being shared, which has been found in various independent sources (Reychav and Weisberg, 2010; Shiuann-Shuoh et al. 2012; Ajzen, 1991).

4.2 Business Expertise

Expertise, or specifically in this case, business expertise, refers to how well versed an individual is in their specific domain. The purpose for the inclusion of expertise, is a qualifying mechanism, with regards to the knowledge that is being shared. The optimal knowledge shared, between one actor and another, can be regarded as Expert Knowledge. Including expertise, as a latent variable, will also assist with the profiling of knowledge sharing. Factors – Intention to share knowledge. The following factors, identified in Table 1, have been identified through reviewing the literature and accompanying research. The selection deliberately sought a holistic list of factors and did not discriminate on researches based upon their sample sizes, amount of citations, or significance criteria identified.

Table 1 - Intention to share knowledge factors

Factor	Intrinsic/Extrinsic	Expected Correlation
Autonomous Motivation	Intrinsic	Positive
Ability to share knowledge	Intrinsic	Positive
Inability to acquire knowledge	Intrinsic	Negative
Self-efficacy	Intrinsic	Positive
Enjoyment of knowledge sharing	Intrinsic	Positive
Network/ Opportunity to share knowledge societal	Extrinsic	Positive
Motivation to Defend Ego or Distort Performance Feedback	Intrinsic	Negative
Lack of Trust	Intrinsic	Negative
Lack of Reciprocity	Extrinsic	Negative
Attitudes towards sharing knowledge (Self)	Intrinsic	Positive
Attitudes towards sharing knowledge (Others)	Intrinsic	Neutral
Sociability	Intrinsic	Positive
Friendship	Intrinsic	Positive
Incentives	Extrinsic	Positive
Minority Group	Extrinsic	Negative
Hierarchical Position	Extrinsic	Negative
Perceived level of interest from learner	Extrinsic	Positive
Professionalism	Intrinsic	Positive

Autonomous Motivation
Autonomous motivation has been identified to have a positive effect on knowledge sharing (Small and Sage, 2006; Hsiu-Fen, 2007; Hau and Evangelista 2007).

Ability to Share Knowledge
Ozmen (2010) identified that an individual's ability to share knowledge is essential for knowledge sharing to occur.

Inability to Acquire Knowledge
Reinholt et al. (2011) found that the ability to acquire knowledge is an important factor in the sharing of knowledge.

Self-Efficacy
Zhang and Ng (2012) found that knowledge sharing was affected by knowledge self-efficacy. This has been supported by Lai and Chen (2014), who found that enjoyment, and self-efficacy, were the most influential factors leading to the intention to share knowledge.

Enjoyment of Knowledge Sharing
Papadopoulos et al. (2012), Lai and Chen (2014), and Hau et al. (2013), all found that enjoyment has a positive effect on knowledge sharing.

Network/Opportunity to Share Knowledge/ Societal
This factor relates to the individual's position within a network. If an actor within a network is considered to have expertise, then it is important that they can be accessed, both at the right time, and by the right people.

Buckman (2004) found that, people who leveraged their network, for knowledge, were successful at obtaining it through organisational "pull", rather than centralized "push".

Motivation to Defend Ego or Distort Performance Feedback
If there is a risk to knowledge sharing then, it is more likely that people will hold their knowledge, for private advantage (Chennamaneni et al. 2012; Buckman, 2004).

Lack of Trust
Sankowska (2013) found that organisational trust is essential, for the transfer, and creation, of knowledge. Chen et al. (2014) established that knowledge sharing can be realized, when business partners are allowed to build up levels of trust.

Lack of Reciprocity
Researchers have identified that reciprocity is an effective motivator in promoting knowledge capacity (Kankanhalli et al. 2005; Wasko and Faraj, 2005; Namjae et al. 2007). This is reinforced by Chennamaneni et al. (2012) who identified, reciprocity as a salient motivator of an employee's likelihood to share knowledge. This position is supported by Hau et al. (2013), who found that the presence of reciprocity has a positive effect on knowledge sharing.

Attitudes Towards Knowledge Sharing (Self)
It is important for an individual to have a positive attitude towards tacit knowledge sharing, or they are unlikely to engage in this practice. Shiuann-Shuoh et al. (2012) found that attitude positively impacts the most upon the intention to share tacit knowledge.

Attitudes Towards Knowledge Sharing (Others)
Shiuann-Shuoh et al. (2012) did not specify attitude as being towards self or others. Therefore, this has been divided into two factors for this research.

Sociability
In an organisation, an individual may be sociable, to a greater or lesser extent. Osterloh and Frey (2000) found that a greater amount of sociability in organisation, led to increased knowledge sharing.

Friendship
Osterloh and Frey (2000) found that friendship was an important part of knowledge sharing. In psychological terms, this is likely to create divisions of 'in-groups' and 'out-groups', depending on how restrictive, and / or how powerful, the knowledge possessed is.

Incentives
Hau et al (2013) found that rewards and incentives reduced knowledge sharing. Incentives of all types have been studied; ranging from financial to non-financial, individual to team, that has support this finding (Hu and Randel, 2014; Wolfe and Loraas, 2008; Fey and Furu, 2008).

Minority Group
This is based upon research by Polzer et al. (2006), who found that minority, or majority, sub-groups, have negative impacts upon knowledge sharing outcomes.

Hierarchical Position
The interviews, this research conducted, yielded an interesting finding, in that peer-to-peer knowledge sharing was more prevalent than hierarchical knowledge sharing.

Perceived Level of Interest from Learner
A common theme uncovered from the interviews in this research indicated that, the individual was motivated when the learner appears interested in the knowledge being shared.

Professionalism
A final finding from these research interviews is that an individuals' self-perception of their level of professionalism, affected their intention to share knowledge. Individuals, who considered themselves professionals, stated that they would not be prevented from sharing their knowledge with others.

4.3 Factors – Business Expertise

Two factors have been selected that, have been identified, to be related to Business expertise. These are found in Table 2. Whether the factor is intrinsic, or extrinsic, is not relevant, and as a result, is not considered.

Factor	Expected Correlation
Consistency and reliability	Positive
Comparison to peers	Positive

Table 2 - Items relating to business expertise

4.3.1 Consistency and reliability

Consistency and Reliability (the CWS measure), is the ability to answer questions from the business, in the same manner, and with the same degree of accuracy. The CWS specifically, refers to 'discrimination', but this was misinterpreted during the interviews, and has been re-presented as 'reliability'. This is expected to have a positive relationship with business expertise.

4.3.2 Comparison to Peers

Comparison to Peers is the process whereby the individual position themselves, when compared to all of their colleagues, and is specifically relating to their business expertise. This is expected to be positively related to business expertise.

4.4 Latent Variable Comparison - Expertise and Knowledge Sharing

The relationship between business expertise, and knowledge sharing, is expected to be positive. This is based upon the assumption that, as an individual accrues knowledge, they will become more confident in what they know and have a desire to share their knowledge.

Figure 1 shows the relationship between the knowledge sharing factors and the Knowledge Sharing latent variable. The expected correlations can be found in Table 1.

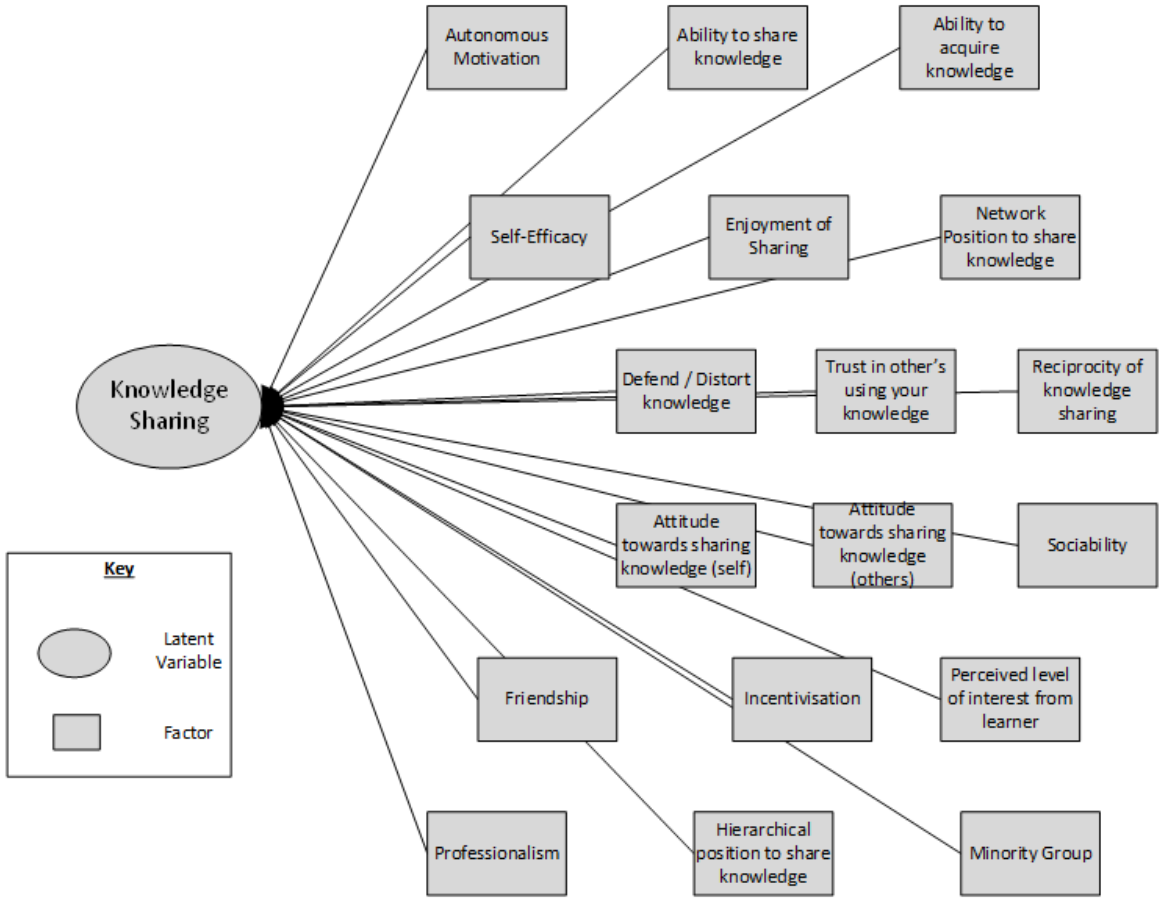

Figure 1: Items related to Knowledge Sharing

Figure 2 details the relationship between the Business Expertise factors and the Business Expertise latent variable. Table 2 shows the expected correlation.

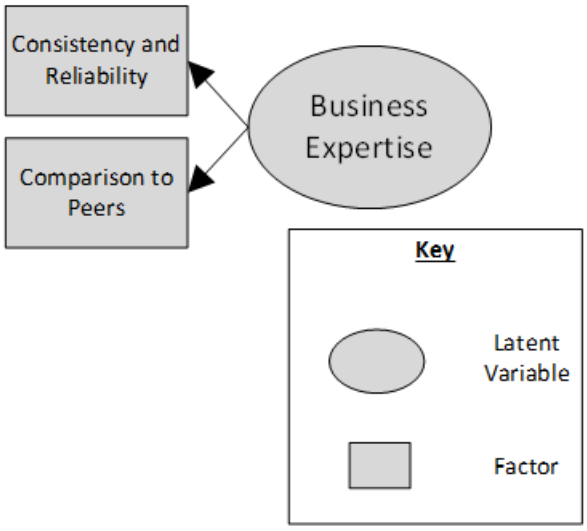

Figure 2: Items related to Business Expertise

Figure 3 shows the relationship between the latent variables and both the Business Expertise and Knowledge Sharing Factors.

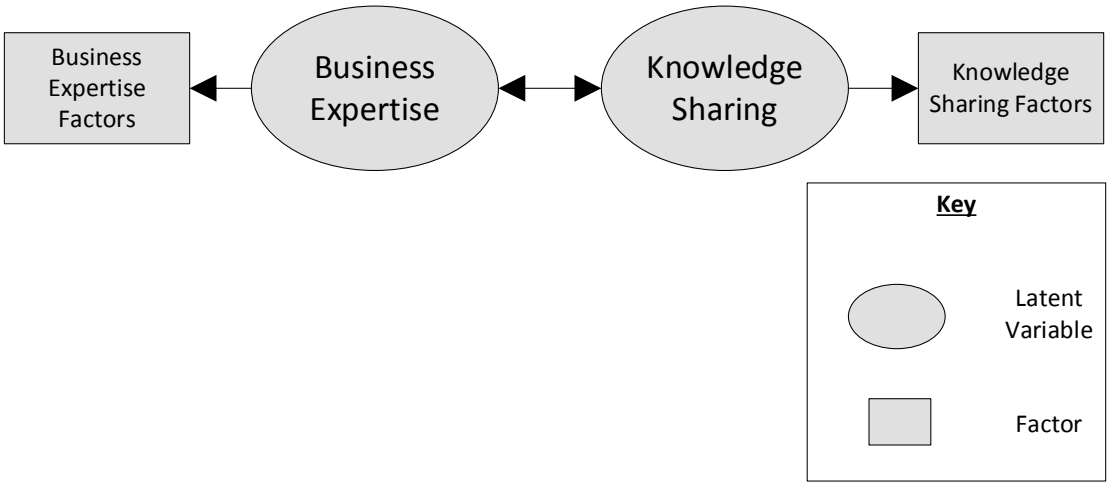

Figure 3: Expected Relationship of Business Expertise and Knowledge Sharing

5. Aim

A1: *To attempt to build a model that tests Business Expertise and Knowledge Sharing factors to enable the categorisation of individuals into different knowledge sharing types.*

6. Hypotheses

H0 – There will be no relationship between the factors and the latent variables.

H1 – Intrinsic factors of knowledge sharing have a positive effect, on an individual's intention to share knowledge

H2 – Extrinsic factors of knowledge sharing have a positive effect on an individual's intention to share knowledge.

H3 – Intrinsic factors of knowledge sharing will have a greater impact on an individual's intention to share knowledge, than will extrinsic factors.

H4 – The expertise factors will have a positive relationship with Business expertise.

H5 – Business expertise and the Intention to share knowledge will be positively related.

Table 1 identifies whether knowledge sharing factors are intrinsic or extrinsic. H1, H2 and H3 relate to the Intention to share knowledge latent variable. H4 relates to the Business expertise factors relating to the Business expertise latent variable. H5 refers to the relationship between the two latent variables (Business Expertise and the Intention to share knowledge).

7. Research Method

7.1 Participants

Participants were selected on an opportunity basis, reliant upon the social and professional networks of the author. This included social media, specifically Twitter, Facebook, and LinkedIn, along with direct e-mail requests.

The eligibility criteria were that, potential participants had worked for at least 3 years, and that they viewed themselves as having some degree of subject matter expertise. The sampling was deliberate in not focussing on any specific sector, or profession. This was based upon previous experience, where attempts to apply such a focus was unsuccessful in achieving sufficient participants.

7.2 Materials

A questionnaire was developed and work flowed into a website, using Lime Service, an open source web research service. The work-flowing specifically broke up the survey, and mandated critical questions to be answered, before the participant was able to progress onto the next section. The questionnaire included an introduction into the research,

and an elective report, detailing the type of knowledge sharer the participant was, based upon the assumptions identified in the literature.

7.3 Design

A questionnaire based design was employed to assess differences between participants. The tool was administered once to all participants, during the four month period between February 2014 and May 2014.

7.4 Procedure

Prospective participants were contacted on an opportunistic basis. They were asked to fill in the survey, and informed that they could receive a report, if requested, detailing their knowledge sharing type. This report was only supplied, after completion, if an e-mail address had been provided.

8. Results & Discussion

8.1 Overview

The model of the research did not achieve a goodness of fit. This means that the model in it's entirety needs to be adapted to ensure that it covers both business expertise and knowledge sharing. There are questions that have been used that have been significantly correlated to either Business Expertise or Knowledge Sharing.

This means that these questions can be used in other researches with a degree of confidence.

This section begins with response rates and descriptive statistics. These are followed by the model testing then a summary. The research aim and hypotheses are then considered followed by the researches limitations, implications and recommendations.

8.2 Analytical Method

A Confirmatory Factor Analysis (CFA) was used, based upon Structural Equation Modelling (SEM) output. The two latent variables, intention to share knowledge, and expertise, were created to attempt to confirm the model, based upon the expected relationships with their factors.

8.3 Response Rate

135 participant responses were achieved of which, 103 completed the entire survey. This means that 76% of participants that started the survey and completed all the mandatory questions. Some questions within the descriptive statistics were optional and, as such, did not achieve the 103 completed responses.

For the purposes of the descriptive and statistical analysis, only those surveys where all the mandatory questions had been completed were considered.

8.4 Descriptive Statistics

Gender

Table 3 shows that almost two thirds (2/3) of participants were male.

Table 3 – Gender

Gender	Total
Male	65
Female	38
Total	103

Age

Table 4 shows that there was a wide age distribution of participants, almost covering the entire span of working ages, when taking into account the requirement of 3 years working experience.

Table 4 - Age

Age	Figures
Upper Limit	65
Lower Limit	24
Range	41
Mean	42.5
Mode	35

Current position

Table 5 shows that very few participants identify themselves as Junior, which might be related to the mean age being 42.5. The majority considered themselves to be professional, with Middle Manager coming in second.

Table 5 - Current Position

What is your current position?	Total
Junior	2
Professional	50
Middle Manager	30
Senior Manager	16
Not Answered	5

Ethnicity

The majority of participants, 85%, identified themselves in the 'White' category, with the smallest populations represented being 'White Irish', 'Mixed / Multiple Ethnic Group White and Asian', and 'Pakistani', all of whom registered 1%. A greater ethnic diversity would need to be sought, for further research.

Table 6 - Ethnicity

Ethnicity	
Any other Asian background	3
Any other White background	13
Asian / Asian British	4
Chinese	4
Mixed / multiple ethnic group White and Asian	1
Mixed / multiple ethnic group White and Black Caribbean	2
Pakistani	1
White English / Welsh / Scottish / Northern Irish / British	74
White Irish	1
Not Answered	0
Total	103

Level of Education

Table 7 shows that 72% of participants had completed higher education (Bachelor or Master's Degree, or PhD). The lowest level of education recorded was Secondary/High School, which made up 5% of participants.

Table 7 - Education

What is your highest level of education you have completed?	Total
Secondary/High School	5
College	12
Vocational Qualification	12
Bachelor's Degree	38
Master's Degree	35
PhD/ Doctorate	1
Not Answered	0
Total	103

Factor Results

Table 8 relates to the factor results from the model. The column on the left details the factors considered within the model. With their loading calculated in the Coef=Loading column. The other columns, from left to right, are the standard error, the Z-score, and the p>[z] significance.

Table 8 - Factor results

Factor	Coef=Loading	Std. Err	z	P>[z]
Autonomous Motivation	0.6511	0.12	5.42	0
Ability to share knowledge	0.2369	0.1375	1.72	0.085
Inability to acquire knowledge	0.1234	0.1336	0.92	0.356
Self-efficacy	0.4271	0.1236	3.45	0.001
Enjoyment of knowledge sharing	0.1552	0.1404	1.11	0.269
Network/ Opportunity to share knowledge societal	-0.1924	0.1272	-1.51	0.13
Motivation to Defend Ego or Distort Performance Feedback	0.2277	0.1277	1.78	0.075
Lack of Trust	0.0712	0.1419	0.5	0.616
Lack of Reciprocity	0.0441	0.1332	0.33	0.74
Attitudes towards sharing knowledge (Self)	0.4423	0.1195	3.7	0
Attitudes towards sharing knowledge (Others)	0.1556	0.1373	1.13	0.257
Sociability	0.2995	0.1355	2.21	0.027
Friendship	0.1542	0.1395	1.11	0.269
Incentives	0.3297	0.1401	2.35	0.019
Perceived level of interest from learner	-0.003	0.1491	-0.02	0.984
Professionalism	0.2217	0.1264	1.75	0.08
Hierarchical Position	0.1905	0.1386	1.37	0.169
Minority Group	0.3318	0.1232	2.69	0.007

8.5 Model Testing

8.5.1 Goodness of Fit (GFI)

The chi-square value, produced by Stata, was 208.03, with degrees of freedom of 167. The significance of the chi-square test is p-value of 0.017 ($p<0.05$).

The root-mean-square error of approximation (RMSEA) is 0.053. The generally accepted level of significance is >= 0.05 (Schumacker and Lomax, 2004, p.81). However, Arbuckle (2007) has stated that this figure is based upon a subjective judgement and can be infallible. Therefore, this slightly higher level of significance will be accepted for this research.

Hu and Bentler (1999) offer a rule of thumb for determining cut-off values using;

RMSEA (<0.6)
Comparative Fit Index (CFI; >0.95)
Tucker Lewis Index (TLI; > 0.95).

The CFI value was found to be 0.549, and the TLI value 0.487.

Using Hu and Bentler's (1999) rule of thumb (RoT);

RSMEA <0.6; accepted at 0.53.
CFI >0.95; rejected at 0.549.
TLI >0.95; rejected at 0.487.

Therefore, this demonstrates that the models' Goodness of Fit must be rejected. Thus, modification indices need to be considered. These are identified in table 9.

Modification indices					
	MI	**df**	**P>MI**	**EPC**	**Standard EPC**
Measurement					
Enjoyment of knowledge sharing <- Business Expertise	4.894	1	0.03	-2.20106	-0.53708
Covariance (Co)					
Autonomous Motivation					
Attitudes towards sharing knowledge (Self)	3.032	1	0.05	0.910484	0.281958
Consistency and reliability	7.371	1	0.01	0.593275	0.372752
Ability to share knowledge					
Self-efficacy	4.016	1	0.05	0.464363	0.231576
Self-efficacy					
Incentives	5.027	1	0.02	-0.53983	-2683524
Autonomous Motivation					
Perceived level of interest from learner	7.928	1	0	1.183926	0.304742
Comparison to peers	4.329	1	0.04	-0.52385	-0.28743
Lack of Trust					
Attitudes towards sharing knowledge (Others)	6.887	1	0.01	0.772673	0.283812

Modification indices	MI	df	P>MI	EPC	Standard EPC
Lack of Reciprocity					
Attitudes towards sharing knowledge (Others)	5.258	1	0.02	0.817311	0.247636
Attitudes towards sharing knowledge (Others)					
Sociability	4.214	1	0.04	-0.83207	-0.22871
Friendship					
Perceived level of interest from learner	5.331	1	0.02	0.995493	0.249868
Incentives					
Perceived level of interest from learner	12.34	1	0	1.306489	0.393379

Table 9 - Modification Indices

Even were all of the modifications adapted into the model it would still not achieve a Goodness of Fit. The covariances provide a view of how some of the factors could be clustered. Such as:

> Lack of Reciprocity, Attitudes towards sharing knowledge (Others) and Sociability
> Perceived level of interest from learner, Friendship, and Incentives.

Variable Testing

8.5.2 Intention to Share Knowledge Latent Variable

Only 6 factors were identified as being significantly related. These can be seen below, ranked based upon the strength of their factor loading.

1) **Autonomous Motivation** (P>0.05). The factor loading was 0.65, with a standardised error of 0.12, and a Z-score is 5.42.
2) **Attitude towards sharing knowledge (Self)** (P>0.05). The factor loading was 0.44, with a standardised error of 0.12, and a Z-score of 3.7.
3) **Self-efficacy** (P>0.05).The factor loading was 0.42, with a standard error of 0.12, and a Z-score of 3.45.
4) **Minority Group** (P>0.05). The factor loading was 0.33, with a standardised error of 0.14, and a Z-score of 2.35
5) **Incentivisation** (P>0.05). The factor loading was 0.33, with a standardised error of 0.14, and a Z-score of 2.35.
6) **Sociability** (P>0.05). The factor loading was 0.16, with a standardised error of 0.14, and a Z-score of 2.21.

This means that, of the factors listed above, 1, 2, 3, and 6 are intrinsic in nature, whilst 4 and 5 are extrinsic.

The greater the number of intrinsic factors, with a collectively higher factor loading, means we can confidently infer that, an individual's intention to share knowledge, is driven, to a greater extent, by intrinsic factors, rather than extrinsic factors.

The non-significantly related items can be observed in Table 9.

Critique of the Intention to Share Knowledge Latent Variable

The identification of 6 factors that are significantly related to the latent variable is promising, but diminished by the lack of GFI. The rejection of 12 factors, which were not found to have a significant relationship, can assist in the focusing of further research into knowledge sharing.

We can consider this to be partially successful in explaining a quarter of core organisational knowledge processes identified by Sambamurthy and Subramani (2005).

8.5.3 Expertise Latent Variable

Consistency and Reliability

Consistency and Reliability (the CWS measure) was found to be significantly related to Business Expertise ($p>0.01$). The factor loading was 0.47, with a standardised error of 0.15, and a z-score of 3.23.

However, this technique has been used in a domain specific assessment of expertise, rather than being distilled into a generic question-based format. This format has been successful, as can be seen from the significant result, and has wider implicates for the research literature, proposing the CWS technique as a new gold standard for measuring expertise. However, this would need to be further supported by research with a larger sample.

Comparison to Peers

Comparison to Peers was also found to be significantly related to Business Expertise ($p>0.01$). The factor loading was 0.62, with a standardised error of 0.18, and a z-score of 3.51. Interestingly, this is less significant than the Consistency and Reliability latent variable, but has a higher factor loading.

8.5.4 Latent Variable Correlation

The latent variables of Intention to share knowledge and Business Expertise were found to be significantly related to each other ($p>0.01$), with a factor loading of 0.71, a standard error of 0.19, and a z-score of 3.66. We can see from the high positive factor loading that, this relationship is positive, whereby, the higher the business expertise, the greater the intention to share knowledge.

8.6 Summary

The research has been successful in confirming the overall relationship of the factors for the intention to share knowledge latent variable. The 2 factors, comprising the business expertise latent variable, were also found to be significantly related to the latent variable. Both of the latent variables were found to be significantly related to each other. However, a GFI was not achieved, for the model, which means there are further factors that need to be considered.

8.7 Aim Testing

The aim of this research was to attempt to build a model that enabled the categorisation of individuals into different knowledge sharing types. 4 Knowledge Sharing Types are identified, however, the limitations of the model are detailed in the critique.

8.7.1 Types of knowledge sharer

Knowledge Sharing Types were defined based upon the 2 business expertise factors and the 6 significant knowledge sharing factors.

The "low" business expertise was comprised of a score of "6" on Consistency and "Average" or lower on Comparison to peers. 13 participants were "low" and 90 were "high".

The "low" knowledge sharing was based upon re-coding the 6 factors in "+3" for Strongly Agree, "+2" for Agree, "+1" for Slightly Agree, "0" for Neutral, "-1" for Slightly Disagree, "-2" for Disagree, and "-3" for Strongly Disagree. When a question was reversed these ratings matched. These were totalled for each participant. A positive total meant "high" knowledge sharing and a negative total meant "low" knowledge sharing. 102 participants were "high" and 1 participant was "low".

Instead of using complex categories as follows:

I. High Knowledge sharing; Low Business Expertise (HKSLBE)
II. High Knowledge sharing; High Business Expertise (HKSHBE)

III. Low Knowledge sharing; High business expertise (LKSHBE)
IV. Low Knowledge sharing; Low business expertise (LKSLBE)

This research has opted for naming different types of knowledge worker:

I. HKSLBE: Catalyst
II. HKSHBE: Maestro
III. LKSHBE: Encyclopaedia
IV. LKSLBE: Novice

Building upon the 6 intentions to share knowledge factors, and the 2 business expertise factors, we can create a Venn diagram (Figure 3).

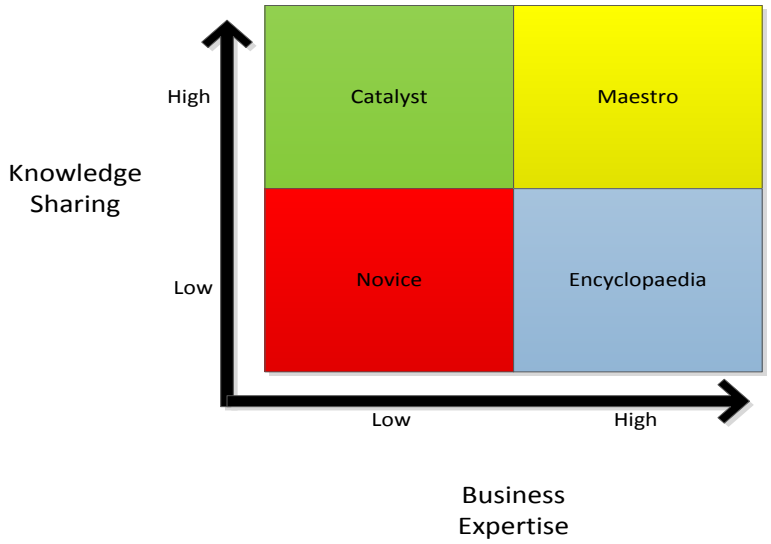

Figure 3- Venn Diagram of Knowledge Sharing Types

The naming of the different type of knowledge sharer is a product of this research. The specific naming is intended to reflect the identity of the category. These will be detailed and the each categorisation critiqued.

The inclusion of the Venn diagram, when the results of this research categorise over 87% of participants into a single type, is to provide a framework for further researches.

Maestro

This is an individual who has both, a high degree of knowledge sharing intention, and business expertise, and is regarded as the optimal type of knowledge sharer.

In terms of their expertise, they are consistent, reliable, and identified as one of the best, in the company, for their domain of business specific knowledge. As long as the business expertise they possess is relevant to the organisation, they will be considered valuable.

Their intention to share knowledge is high, based upon the 6 significant factors identified. As 4 out of 6 factors here are intrinsic, they must have at least a moderate degree of intrinsic factors leading to their intention, but these need to be balanced with high extrinsic factors.

Catalyst

This individual has a high degree of knowledge sharing, but can potentially be considered a liability, due to the fact that they do not possess a high level of business expertise. They can be converted in to an organisational asset, if they are positioned in an area of relevance, or growth, where they could develop their expertise, with the view of becoming a maestro.

In terms of expertise, they are inconsistent, unreliable, and not identified as one of the best in their domain. However, like the maestro, they must possess, at least, a moderate degree of intrinsic factors that lead to the intention to share knowledge.

Encyclopaedia

This was a description that one of the interviewees made regarding their manager, who apparently knew everything about their domain, but was not well placed, or sufficiently motivated, to share their knowledge.

An encyclopaedic individual is consistent, reliable, and identified as one of the best, for their business expertise, but does not intend to share their knowledge. For Encyclopaedias, it is worth considering whether, through leveraging extrinsic factors, they could move to a moderate degree of knowledge sharing.

Failing this, once they have fulfilled their purpose, they should be removed from the organisation, to mitigate any potential damage, of the departure of their tacit knowledge.

Novice

This individual has neither high business expertise, nor the intention to share their knowledge. This means that they do not have the same degree of liability of a Catalyst, who would share knowledge even though they only know a little. However, because they know a small amount of knowledge, but would not be inclined to share it, their membership of an organisation is questionable.

They could, through training and investment, move to a position of encyclopaedia, but this effort would have an element of risk associated with it, since they still would not share their knowledge. Ultimately, they would need to be removed from the organisation.

8.7.2 Critique of Types of Knowledge Sharing Types

Based upon these categorisations, the results of this survey can be found in table 12

Table 12 - Count of Knowledge Sharing Types

Knowledge sharing type	Count
Maestro	90
Catalyst	12
Encyclopaedia	0
Novice	1

We can see, from the categorisation of individuals, that they are not evenly distributed. For expertise, this is an expected outcome, based upon the participant selection criteria, where individuals needed to have had at least 3 years business experience. There is also expected to be a degree of self-assessment bias in these results, relating to expertise through the self-assessment process. A greater number of participants is also needed along with a model that provides a Goodness of Fit.

8.8 Hypothesis Testing

H0 *– There will be no relationship between the factors and the latent variables.*

Whilst not all of the items had significant relationships to their latent variables six out of eighteen factors (or 33.3%) were significantly related to the intention to share knowledge. Both of the expertise factors were significantly related to the Business Expertise latent variable (or 100%).

Therefore we can reject the null hypothesis.

H1 *– Intrinsic factors of knowledge sharing have a positive effect on an individual's intention to share knowledge.*

When we exclude the non-significant factors, we can see that the 4 intrinsic factors knowledge sharing factors have a positive effect on an individual's intention to share knowledge.

The 4 significant intrinsic factors have an average factor loading of 0.45, showing a positive effect.

This is a moderate positive effect, but still a positive effect, therefore this hypothesis cannot be rejected.

> ***H2*** *– Extrinsic factors of knowledge sharing have a positive effect on an individual's intention to share knowledge.*

There were only 2 knowledge sharing factors that were found to be significant in this research that were identified as extrinsic. These were found to have a positive correlation to the individual's intention to share knowledge.

These two factors had an average factor loading of 0.33, demonstrating a positive effect, and therefore, this hypothesis cannot be rejected.

> ***H3*** *– Intrinsic factors of knowledge sharing will have a greater impact on an individual's intention to share knowledge than extrinsic factors.*

The greater quantity, and quality, of intrinsic factors, over extrinsic factors, means that we cannot reject this hypothesis. This is reinforced by intrinsic factors (0.45) having a greater factor loading then extrinsic factors (0.33). However, it is worth noting that, a smaller selection of extrinsic factors were identified in the literature, and have therefore not been included in this research.

> ***H4*** *– The expertise factors will have a positive relationship with business expertise.*

The two factors are both significantly related to business expertise, with positive factor loadings. Therefore this hypothesis must be accepted.

> ***H5*** *– Business expertise and the Intention to share knowledge will be positively related.*

This has been found to be true, for this research, and means that this hypothesis must be accepted.

8.9 Limitations

There were two main limitations of this research.

The goodness of fit of the model
The model was rejected in terms it's GFI. Further research would benefit from identifying additional modification paths, and factors, for consideration. Further factors would need to be considered to achieve a GFI, since the paths alone are insufficient to achieve this.

Number of participants
The number of participants was at the lower end of the scale, but accordingly to Ding et al.'s (1995) review of studies, 100 to 150 participants is the minimum for SEM. This means that more participants would be beneficial for future research.

8.10 Implications of this research

The implications are separated into academic benefits and practitioner implications.

8.10.1 Academic implications

This research has been partially successful at collecting and testing factors found in the literature that, are expected to have some degree of correlation to the intention to share knowledge. However, the lack of GFI means that further exploration is required beyond what has been found in this research. Additionally, the low sample size means that a greater number of participants for future research would be needed.

Intrinsic factors were found to relate more strongly, than extrinsic factors, to the intention to share knowledge. Therefore, future research into knowledge sharing would benefit from focusing particular effort on intrinsic factors.

The CWS measure has successfully been employed in a generic questionnaire based manner. This indicates that the following question could be tested in wider research into expertise.

> *"Relating to your business expertise above - out of the last 10 questions at work, how many did you quickly and correctly answer?"*

8.10.2 Practitioner implications

The four types of knowledge sharer and expertise measures, with their underlying data, specifically benefit organisations in 4 ways.

1) **Recruitment –** To identify if a prospective employee exhibits knowledge sharing attitudes. This would effectively enable the removal of prospective candidates, if they do not demonstrate the required amount of intention to share knowledge.
2) **Assessing organisational state –** The questionnaire could be used to identify factors affecting business units, or the organisation's levels of knowledge sharing, for both base-lining either, a change in programme, or a longitudinal review of knowledge sharing, within the organisational area, to evaluate success.
3) **Restructuring –** This tool could be used, in conjunction with other methods, to determine how best to restructure teams. Specifically with regards to creating innovative teams, or less innovative teams, depending on the business requirements.
4) **Team Building –** Identifying inhibitors of knowledge sharing, across teams, and then taking relevant action to address this.

8.11 Recommendations for further research

The recommendations for further research are grouped into five categories.

Factor enhancement
We have successfully identified 6 factors that are significantly related to the intention to share knowledge. If the significant factors were broken down into their component parts and analysed within a larger sample population, this would add accuracy and power to the model.

Consideration of additional knowledge processes
This research focused upon knowledge sharing. However, the three processes that were omitted were knowledge creation, knowledge storage, and knowledge application.

Were these to be added to this model, a holistic overview could be achieved of all the organisational knowledge processes. A holistic model would add value to both academics and practitioners that would enable the identification of the factors that act as predictors to all four processes.

Enhancement of the focus upon expertise
Expertise comprised of two questions that were significantly related to business expertise. The reason that further factors were not included was to focus upon the intention to share knowledge latent variable. Future research could expand upon these aspects.

Observer assessment
This research has focused exclusively upon individual's self-assessment against various questions. The reason for this was twofold; to reduce the number of questions to attempt to maximise response rates, and by removing the need for participants to know each other. This last point would certainly be needed for the inclusion with an observer assessment. Zhou et al. (2012) found assessment of others removed the self-assessment bias.

Agency Based Social Simulation
A growing focus of literature is using social situation software to generate models for behaviour (Lanham and Carley, 2014; Nemiche et al. 2013; Villatoro, 2013). The four core knowledge organisational processes, when analysed, could be coded into such a model. This should then be able to identify the patterns of behaviour among employees for all these processes.

9. Conclusion

This research has been partially successful in achieving both its' aim and testing the hypotheses. A model has been developed that achieves part of it's purpose in identifying who is likely to share their knowledge within an organisation and the underlying reasons for this. This model also can also be used to categorise individuals into 4 distinct types of knowledge sharer. The model itself would benefit from further testing and refinement.

The lack of goodness of fit of the model meant that, the items require further consideration, along the lines of the modification indices that were offered. The modification indices alone are insufficient to achieve a Goodness of Fit, and therefore further knowledge sharing factors need to be identified.

Further research would benefit from building on foundations of this research to encompass the additional organisational knowledge processes. This would enable a holistic view of the knowledge life-cycle within organisations. This research should include observer assessment, which would act as a countenance to the self-enhancement bias that has potentially occurred in this research.

A much greater number of participants and an exploration into the relationship between participants would enable observer assessments to be conducted. This would require participants to know each other, this would perhaps, be facilitated in a single medium to large company.

If this research was to be repeated, a greater amount of interviews, and focus groups, should take place, to identify further items that may have led to the intention to share knowledge.

References

Ajzen, I. (1991), The theory of planned behaviour, Organizational Behaviour & Human Decision Process, 50 (2), pp.179–211.

Arbuckle, J.L. (2007), Amos 16.0 User's Guide. Chicago: SPSS Inc.

Barth, S. (2000), Heeding the sage of the knowledge age [Online]. Available at: http://www.destinationcrm.com/articles/default.asp?ArticleID=832

Bautista-Frias, L., Romero-Gonzalez, R., and Morgan-Beltran, J. (2012), Knowledge maps in the conversion of tacit knowledge as a competitive strategy, Advances In Competitiveness Research, 20 (3/4), pp.47-58.

Bonner, D. (2000), Knowledge: from theory to practice to golden opportunity, American Society for Training & Development, September-October, pp.12-13.

Borges, R. (2013), Tacit knowledge sharing between IT workers. The role of organizational culture, personality, and social environment, Management Research Review, 36 (1), pp.89-108.

Buckman, R. H. (2004). Building A Knowledge-Driven Organization. McGraw-Hill: United States of America

Busch, P., Richards, D., Dampney, C. N. G. (2003), The graphical interpretation of plausible tacit knowledge flows. Conferences in Research and Practice in Information Technology.

Cambridge Dictionaries Online. Source http://dictionary.cambridge.org/dictionary/english/knowledge-worker extracted on 16/11/2015 at 18:08.

Carr, M. (2010), The importance of meta cognition for conceptual change and strategy use in mathematics, in Waters, H. S. and Schneider, W. (eds.) Meta cognition, strategy use and instruction. New York: Guilford Press. pp. 176-197.

Chen, Y. H., Lin, T. P., and Yen D. C (2014), How to facilitate inter-organizational knowledge sharing: The impact of trust, Information & management. 51 (5), pp.568-578.

Chennamaneni, A., Teng, J., and Raja, M. (2012), A unified model of knowledge sharing behaviours: theoretical development and empirical test. Behaviour & Information Technology, 31 (11), pp.1097-1115.

Cho, N., Li, G. Z., and Su, C. Z. (2007), An empirical study on the effect of individual factors on knowledge sharing by knowledge type. Journal of Global Business and Technology, 3 (2), pp.1-15.

Cooper, D. (2006) Knowledge Workers, Canadian Businesses. 79 (20), p.59.

Costa, B. and Porter, G. (2003), 'Mutual Fund Managers: Does Longevity Imply Expertise?', Journal Of Economics & Finance, 27 (2), p.224.

Ding, L., Velicer, W. F., & Harlow, L. L. (1995). 'Effects of estimation methods, number of indicators per factors, and improper solutions on structural equation modelling fit indices'. Structural Equation Modelling: A Multidisciplinary Journal, 2, 119-143.

Drucker, P. (1957), Landmarks of Tomorrow. New York: Harper & Row. p.122.

Ericsson, K. A., Krampe, R., T., H., and Tesch-Romer, C. (1993), The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100 (3), pp.363-406.

Fetterhoff, T., Nila, P., and McNamee, R. C. (2011), 'Accessing internal knowledge: organizational practices that facilitate the transfer of tacit knowledge'. Research Technology Management, 54 (6), pp.50-54.

Fey, C. and Furu, P. (2008). Top management incentive compensation and knowledge sharing in multinational corporations. Strategic Management Journal, 29 (12), pp.1301-1323.

Germain, M. and Tejeda, M. (2012), 'A preliminary exploration on the measurement of expertise: An initial development of a psychometric scale', Human Resource Development Quarterly, 23 (2), pp.203-232.

Gubbins, C., Corrigan, S., Garavan, T., Connor, C., Leahy, D., Long, D., and Murphy, E. (2012), Evaluating a tacit knowledge sharing initiative: a case study, European Journal of Training & Development, 36 (8), pp.827-847.
Hau, L. N. and Evangelista, F. (2007), Acquiring tacit and explicit marketing knowledge from foreign partners IJVs. Journal of Business Research, 60 (11), pp.1152-1165.
Hau, Y., Kim, B., Lee, H., and Kim, Y. (2013), 'The effects of individual motivations and social capital on employees' tacit and explicit knowledge sharing intentions', International Journal Of Information Management, 33 (2), pp.356-366.
Hu, L. and Randel, A. (2014), Knowledge Sharing in Teams: Social Capital, Extrinsic Incentives, and Team Innovation. Group & Organization Management, 39 (2), pp.213-243.
Hu, L. and Bentler, P.M. (1999), Cutoff criteria for fit indexes in covariance structure
analysis: conventional criteria versus new alternatives. Structural Equation Modelling,
6, pp.1-55.
Hsiu-Fen, L. (2007), Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions. Journal of Information Science, 33 (2), pp.135-149.
Kankanhalli, A., B. C. Y. Tan, and K. K. Wei (2005), Contributing Knowledge to Electronic
Knowledge Repositories: An Empirical Investigation, MIS Quarterly, 29 (1), pp.113-143.
Kennedy, J., Gubbins, C., and Buckley, F. (2012), How do Individuals Affect the Process of Managing Tacit Knowledge? Proceedings Of The European Conference On Knowledge Management, 21411-1417.
Kumaraswamy, K. S. N. and Chitale, C. M. (2012), Collaborative knowledge sharing strategy to enhance organizational learning, Journal of Management Development, 31 (3), pp.308-322.
Lai, H. M. and Chen, T. T. (2014). Knowledge sharing in interest online communities: A comparison of posters and lurkers. Computers in Human Behaviour, 35, pp.295-306.
Lanham, M., Morgan, G., and Carley, K. (2014), Social Network Modeling and Agent-Based Simulation in Support of Crisis De-Escalation. IEEE Transactions on Systems, Man & Cybernetics. Systems, 44 (1), pp.103-110.
Lee, J. (2000), Knowledge management: the intellectual revolution. IIE Solutions, 32, pp.34-37.
Lin, I., Seidel, R., Shekar, A., Shahbazpour, M., and Howell, D. (2012), Knowledge Sharing Differences Between Engineering Functional Teams: An Empirical Investigation. Journal of Information & Knowledge Management, 11 (3), 1250021-1-1250021-14.
Liu, Y. and Phillips, J. S. (2011), Examining the antecedents of knowledge sharing in facilitating team innovativeness from a multilevel perspective. Information Management, 31 (1), pp.44-52.
McHugh, M. D. and Lake, E. T. (2010), Understanding Clinical Expertise: Nurse Education, Experience, and the Hospital Context, Research in Nursing and Health, 33 (4), pp.276–287.
Michailove, S. and Minbaeva, D. (2012), Organizational Values and Knowledge Sharing in Multinational Corporations: The Danisco Case, International Business Review, 21 (1), pp.59-70.
Namjae, C., Guo Zheng, L., and Che-Jen, S. (2007), An empirical study on the effect of individual factors on knowledge sharing by knowledge type, Journal Of Global Business & Technology, 3 (2), pp.1-15.
Nemiche, M., M'Hamdi, A., Chakraoui, M., Cavero, V., and Pla Lopez, R. (2013), A Theoretical Agent-Based Model to simulate an Artificial Social Evolution. Systems Research & Behavioral Science, 30 (6), pp.693-702.
Nesheim, T & Hunskaar, H, M (2015). When employees and external consultants work together on projects: Challenges of knowledge sharing. International Journal of Project Management 07/2015; 33(7)
Osterloh, M. and Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms, Organization Science, 11 (5), pp.538-550.
Ozmen, F. (2010), The capabilities of the educational organizations in making use of tacit knowledge. Procedia - Social and Behavioral Science, 9, pp.1860-1865.
Papadopoulos, T., Stamati, T., and Nopparuch, P. (2012), Exploring the determinants of knowledge sharing via employee knowledge sharing via employee weblogs. International Journal of Information Management, 33 (1), pp.133-146.
Pauley, K., O'Hare, D., and Wiggins, M. (2009), Measuring Expertise in Weather-Related Aeronautical Risk Perception: The Validity of the Cochran-Weiss-Shanteau (CWS) Index. International Journal of Aviation Psychology, 19 (3), pp.201-216.
Poldrack, R. A., Prabhakaran, V., Seger, C. A., and Gabrieli, J. D. E. (1999), Striatal activation during acquisition of a cognitive skill, Neuropsychology, 13 (4), pp.564 –574.
Polzer, J., Crisp, C. B., Jarvenpaa, S.L., and Kim, J. W. (2006). Extending the faultline model to geographically dispersed teams: How collocated subgroups can impair group functioning, Academy of Management Journal, 49 (4), pp.679–692.
Reinholt, M., Pedersen, T., and Foss, N. J. (2011), Why a central network position isn't enough: the role of motivation and ability for knowledge sharing in employee networks. Academy of Management Journal, 54 (6), pp.1277-1297.
Reychav, I. and Weisberg, J. (2010), Bridging intention and behavior of knowledge sharing, Journal of Knowledge Management, 14, pp.285–300.
Ryan, S. and O'Connor, R. V. (2013), Acquiring and sharing tacit knowledge in software development teams: An empirical study. Information & Software Technology, 55 (9), pp.1614-1624.
Sankowska, A. (2013), Relationships between organizational trust, knowledge transfer, knowledge creation, and firm's innovativeness, Learning Organization, 20 (1), pp.85-100.
Sambamurthy, V. and Subramani, Mani. (2005), Special Issue on Information Technology and Knowledge Management, MIS Quarterly, 29 (2), pp.193-195.
Schumacker, R. E. and Lomax, R. G. (2004) A Beginner's Guide to Structural Equation Modeling, Volume 2: Lawrence Erlbaum Associates.

Senge, P. M. (1990), The Fifth Discipline. America: Doubleday/Currency.
Weiss D. J., and Shanteau J. (2014), Who's the Best? A Relativistic View of Expertise, Appl. Cognit. Psychol., 28: 447–457. DOI: 10.1002/acp.3015
Shanteau, J., Weiss, D., Thomas, R., and Pounds, J. (2003), How can you tell if someone is an expert? Performance-based assessment of expertise, in Schneider, S. L. and Shanteau, J. (eds.) Emerging perspectives on judgment and decision research. New York: Cambridge University Press. pp. 620-639.
Shiuann-Shuoh, C., Yu-Wei, C., and Pei-Yi, C. (2012), Behavioral Intention formation in knowledge sharing: Examining the roles of KMS quality, KMS self-efficacy, and organizational climate. Knowledge-Based Systems. 31, pp.106–118.
Small, C. and Sage, A. (2006), Knowledge management and knowledge sharing: A review, Information Knowledge Systems Management, 5 (3), pp.153-169.
Solano, B. R. (2010), Organizational politics, personality and willingness to share knowledge: The mediational role of employee engagement, Dissertation Abstracts International, 71, 2-B.
Villatoro, D. (2013), Social norms for self-policing multi-agent systems and virtual societies, AI Communications, 26 (2), pp.255-256.
Wang, Z. and Wang, N. (2012), Knowledge sharing, innovation and firm performance, Expert Systems with Applications, 39 (10), pp.8899-8908.
Wasko, M. and Faraj, S. (2005), Why should I share? Examining social capital and knowledge contribution in electronic networks of practice, MIS Quarterly, 29 (1), pp.35-57.
Wah, L. (1999), Making knowledge stick, Management Review, 88 (5), pp.24-9.
Witteman, C., Weiss, D., and Metzmacher, M. (2012), Assessing Diagnostic Expertise of Counselors Using the Cochran—Weiss—Shanteau (CWS) Index. Journal of Counselling & Development, 90 (1), pp.30-34.
Wolfe, C. and Loraas, T. (2008), Knowledge Sharing: The Effects of Incentives, Environment, and Person. Journal of Information Systems, 22 (2), pp.53-76.
Wright, T. and Bonett, D. (2002). The Moderating Effects of Employee Tenure on the Relation Between Organizational Commitment and Job Performance: A Meta-Analysis. Journal of Applied Psychology, 87 (6), pp.1183-1190.
Yuan, Y., Zhao, X., Liao, Q., and Chi, C. (2013), The use of different information and communication technologies to support knowledge sharing in organizations: From e-mail to micro-blogging. Journal of The American Society For Information Science & Technology, 64 (8), pp.1659-1670.
Zhang, P. and Ng, F. (2012), Attitude toward knowledge sharing in construction teams, Industrial Management & Data Systems, 112 (9), pp.1326-1347.
Zhou, K. and LI, C. (2012), How knowledge affects radical innovation: Knowledge base, market knowledge acquisition, and internal knowledge sharing, Strategic Management Journal, 33 (9), pp.1090-1102.

