# Knowledge Value Life Cycle: Model for Valuing Knowledge

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*Abstract*– Knowledge is a valuable asset as it brings success and sustainability to the organizations around the world. Till recently, the value of an organization is determined from its financial statements. However, these statements are historical in nature and does not depict the true worth of the organization. The future benefit from the organization depends upon its capability to make best use of its assets including knowledge. However there is no business document that shows the volume and value of knowledge present in the organization. It is critical to determine the value of knowledge to ascertain true worth of an organization. This research study attempts to presents factors that influence the value of knowledge during its life cycle. After detailed analysis, finally all were grouped into 'Contemporary Factor' and 'Futuristic Factor' for valuing knowledge. The integration of Futuristic and Contemporary factors forms the Knowledge Value Wheel (KVW) that helps in defining the "Knowledge Value Line" (KVL). The KVL depicts the value of knowledge at any given time. The KVL and KVW combines to form the "Knowledge Value Life Cycle" (KVLC). The applicability of identified factors at various phases of KVLC were examined and discussed. The findings of this study is universally applicable. It will help further research in the area of knowledge management. Managers would be able to differentiate most valuable and useful knowledge asset for effective management. It would also be beneficial to the investors in determining the true worth of the organization in terms of its knowledge asset.

*Keywords*– Knowledge, Knowledge Management, Value of Knowledge, Knowledge Lifecycle, Knowledge Value Line, KVL, Knowledge Value Wheel and KVW

## I.  INTRODUCTION

The shift of the competitive market environment from physical factors to an internet enabled information based intangible factors (Varadarajan, Yadav and Shankar, 2008) has increased the importance of knowledge management. This makes knowledge a strategic resource for competitiveness (Feher, 2004). Over the years, effective and efficient management of knowledge has emerged as a challenge to business firms (Blumentritt and Johnston, 1999).

Knowledge has become the most important and critical source for power and may eventually replace other resources (Nonaka and Takeuchi, 1995). Financial statements showing historical and book values are not enough to judge organizations true capability to generate future profits. The potential to generate future revenue comes from the knowledge organization possess. So far, it is difficult for the stakeholders to gauge the knowledge present in the organization. Therefore, there is a clear need for an empirical research, designed to study the knowledge and its potential for generating future revenue.

Abundant literature is available on the knowledge life cycle (Benya, et.al, 2004), but the monetary value of knowledge were hardly investigated (Haque and Manarvi, 2010), therefore literature on determining the value of knowledge at its different phases of life cycle are very limited. As a result, it was difficult to establish the beginning point for this research. We believe, the absence of identified factors that impacts the value of knowledge is the reason for knowledge being not valued. In this research, we first identified in available literature, 22 critical variables that are used in ascertaining value of tangible assets, products and services. The twenty-two variables were: 1.Competitive advantage, 2.Attracting investment, 3.Number of users, 4.Intellectual capital, 5.Transfer of knowledge, 6.Market awareness, 7.Business process, 8.Work instruction, 9.Problem solving, 10.Human capital, 11.Communicating cost, 12.Cost of generating new knowledge, 13.New product development, 14.New service offered, 15.Product improvements, 16.Improvement in services, 17.Intellectual property right, 18.Monetary benefit, 19.Personal benefit, 20.Protection of new knowledge, 21.Individual time, and 22.Total time.

## II.  CONCEPTUAL AND THEORETICAL BACKGROUND

In economics, value means estimated market worth of commodities, services, and works (Renner, 2003). Valuing an intangible asset like software license is practical; however, tacit knowledge and employee expertise are difficult to value. We have centimeter for length, byte for data and euro for expense, but there is no specific unit to measure the knowledge.

The model of value chain (Porter, 1996) gave rise the concept of 'Knowledge Value Chain' (Holsapple and Singh, 2001) which helps organizations in understanding and handling the knowledge resources. Since knowledge resides in the human minds (Krogstie, Sindre and Jorgensen, 2006), therefore, the increase in the knowledge of worker cannot be

quantified and easily valued. The knowledge is being valued because it benefits the decision maker in evaluating the uncertainty while making rational decision.

There are number of issues that need to be resolved before a unit can be determined for the value of knowledge. Prichard (2007) identified three problems: primary (why knowledge is more valued than true belief), secondary (why a whole of knowledge is more important than any of its part), and tertiary (why knowledge is more valued than anything which falls short of knowledge).

In its life cycle, initially, knowledge may not be useful (Birkinshaw and Sheehan, 2003), hence it will not be valued, but further development makes it beneficial. When it becomes beneficial, it will be valued. Therefore, knowledge has to continuously evolve and grow itself to supplement its ability to arrive and remain useful and hence become valuable.

Now, it is clear that knowledge has certain value beyond any doubt. Previous studies show lack of direct focus on the issue of determining the value of knowledge in terms of identification of factors impacting on the value of knowledge. We believe this is the key issue required in the determination of the value of knowledge. The concepts and findings would be applicable to all sorts of businesses across the globe.

### A. Hypothesis

To cross check the twenty two variables unstructured interviews were conducted with industry professionals. Organizations were selected from the listing of Karachi Stock Exchange (KSE) index. KSE has 36 sectors to group all the listed organizations. Based on size and volume of shares traded, two organizations were selected from each sector. It is assumed that large organization would be having effective and efficient knowledge management system and its results would be reflected on price and volume of common stocks traded on the floor. Requests for interview with manager having responsibility of knowledge management or similar were sent to 72 firms. Only 38 gave consent for the interview. Later 2 managers declined the request due to official commitments. The interviewees agreed that the identified 22 variables have impact on the value of knowledge. The 22 variables were grouped into 7 constructs based on their logic, concepts and similarity in nature. To test the validity of each construct, separate hypotheses were built.

*1) Strategic Advantage* {Competitive advantage, Attracting investment}*:* Knowledge is a multiplicative asset that provides strategic and competitive advantage to the organization in its various operations (Mesaric, 2004). Business organizations become attracted to help academia in their research work. In return, they expect new knowledge that can lead to innovative products. So a continuous flow of information, knowledge and funding gets established between academia and industry. Thus we hypothesize that knowledge will be valued high when it gives strategic advantage to the firm.

> *Hypothesis 1: The more strategic advantage a firm gets from a knowledge, the more valued will be the knowledge.*

*2) Benefit to the Creator/Acquirer of the Knowledge* {Intellectual capital, Human capital, Intellectual property right, Protection of new knowledge}: There is a positive relationship between intellectual capital and the ability to develop new products (Chen, James and Chang, 2006). Employees having specialized or expert knowledge functions as an intellectual capital and are valued in the organization (Lyon, 2005). The law of Intellectual Property is about protecting the rights of the creator from misuse of vital concept (Woker, 2006). Therefore we can hypothesize that newly generated or acquired knowledge can provide benefit to the holder.

> *Hypothesis 2: The more benefits new knowledge provides to its creator/acquirer the more valued will be the knowledge.*

*3) Business Process Improvement* {Business process, Work instruction, Problem solving}: Business Process Improvement (BPI) is a systematic approach that enables the organization to improve its different processes in order to achieve better results. Work Instruction, developed on the basis of several knowledge, guides workers to organize and perform task systematically, effectively, and professionally (Malet, et. al., 2006). Problem solving activity is a regular feature of managers and professionals. Analysis based on latest knowledge helps managers in making effective problem solving activities. Thus we believe that knowledge helps in business process improvement.

> *Hypothesis 3: The more supportive the knowledge is in business process improvement, the more valued will be the knowledge.*

*4) Cost of Creating and Communicating Knowledge* {Transfer of knowledge, Market awareness, communicating cost, Cost of generating new knowledge}: There are three core issues in knowledge transfer: whom to transfer, what is to be transferred, and how it can best be transferred (Jasimuddin and Zhang, 2011). The process of communication incurs various costs like, interruption in the communication process, social, and technical cost, etc., (Ye, Nakakoji and Yamamoto, 2007). To gain advantage, at times organization advertises their research results or acquisition of new technology/knowledge to develop potential market for their incoming new products and services. Cost Engineering is practiced in industries where generation of new knowledge is considered critical for survival and growth (Xu et al, 2011). Thus we believe that cost is an important element in valuing the knowledge.

> *Hypothesis 4: The more cost incurred in creating and communicating the knowledge, the more valued will be the knowledge.*

*5) Outputs in the form of Products and Services* {New product development, New service offered, Improvement in products, Improvement in services}: Innovation is a multidimensional, complex, and dynamic process and has strong impact on productivity (Tang and Le, 2007). New product development is considered complex activity and an exercise in information processing (Montagna, 2011). Product

improvement is a significant enhancement of product's functionality and benefits (Lee and Kang, 2007) and is a result of deliberate effort in knowledge generation to increase product capability and use-ability. Innovation is equally applicable to the creation of new value-added services to the customers (Lee and Ali, 2010). Therefore, it is anticipated that new knowledge is a source for generating new products and services as well as bringing improvement in the products and services too.

*Hypothesis 5: The more useful the knowledge is in creating/enhancing innovative products/service, the more valued will be the knowledge.*

*6) Benefit to the Knowledge User* {Monetary benefit, Personal benefit}*:* If a significant number of user benefits from a knowledge, that knowledge could be valued high. Boeing 787 aircraft will serve large number of travelers/customers and airlines are expected to generate revenue from it (Boeing, 2009). Job involvement, commitment, and engagement has impact on employee motivation leading to employee benefits (Shaheen and Farooqi, 2014). This leads to the following hypothesis:

*Hypothesis 6: The more beneficial the knowledge is to the user, the more valued would be the knowledge.*

*7) Time Period Involved* {Individual time, Total time}*:* Quality in research work are judged by its inputs: time spent, research funds available, research facilities, networks ties, professional training and education, level of personal motivation, environment for research, and the research outputs (Tien, 2000). Often, when the duration of research activity increases, its cost also increases. Thus, it is generally expected that duration in research should affect the value of new knowledge.

*Hypothesis 7: The more time spent on creating new knowledge, the more valued will be the knowledge.*

### III. RESEARCH DESIGN

To test the 7 hypothesis, a field survey method was adopted using a convenient sample.

#### A. Questionnaire Development

A questionnaire was developed with 52 items to empirically test the 7 constructs. Multiple evaluation technique was used to improve the reliability and validity of the measure. This helped to make the probability of a Type II error negligible (Dirkzwager, 2003). In the light of the feedbacks from academicians, and experts during seven pretests, a 3 point questionnaire having "Agree", "Neither Agree Nor Disagree", and "Disagree" in scale was finalized having 52 questions/items. A three point questionnaire was suggested since the level of sensitivity is not an issue in this study. The questionnaire was used to collect responses from the 521 respondents who were professionals, managers, and decision makers. The Cronbach's alpha value was 0.8983 greater than 0.70, suggests that the items in the instrument are measuring the same construct. The correlation result of test-retest was

0.968 which is high and gives considerable reliability to the instrument.

#### B. Population and Sample Size

The population size of this study is 9.65 million people. They are literate and living in urban areas of Pakistan and belong to the age bracket of 25-70 years (Pakistan Economic Review, 2010). With confidence level adjusted to 95% and confidence interval set at 5%, the sample size comes out to be 384. Taking responses from 521 respondents minimized the chances of Type I and Type II errors.

#### C. Data Collection and Sample Characteristics

The primary source of sampling frame was the professionals and managers nominated by their respective organizations for management training at Pakistan Institute of Management (PIM). Therefore we can safely consider the sample size as representatives of the professionals and managers in Pakistan. Demographically the data distribution was found true representation of the economy therefore responses were considered appropriate for this study.

### IV. ANALYSIS AND RESULTS

#### A. Data Characteristics

Overall, majority of the respondents (98.10%) has validated the relationship between each item and variables. Only 1.9% disagreed and did not validate the relationship between the items and the variables.

#### B. Frequency Analysis

Results of frequency analysis shows most of the items were validated by the respondents for having impact on the value of knowledge, thus establishing the fact that developed constructs has impact on the value of knowledge (Table 1). As a result, we have a mixed result for items and variables. This means our initial grouping of items into variables and constructs needs to be revised. This requires us to use dimension reduction factor analysis using varimax rotation at item level.

#### C. Reliability and Validity of Measurement Instrument:

Standard deviation was applied on whole data and the result remained between 0.90 and 0.241 which is the indication that the concepts is covered by respective items and are also understood well. The mean of all the items are more than 2.0, indicating, respondents, in general, agree with the relationship mentioned in each items. With alpha value of 0.05 and df=2, the chi square analysis values are all greater than 5.991. The KMO value is 0.772 (higher than 0.50) and Bartletts test of Sphericity had the significance value less than 0.05 indicates the suitability of data for structure detection and factor analysis. Content validity of the survey instrument was established by adopting instruments that had already been used and validated in previous literatures. All items were

Table 1: Frequency Analysis of Responses on the Basis of Each Item, Variable and Construct

| Construct | Variable from the Past Literature | Items | Agree % | Dis-Agree % |
|---|---|---|---|---|
| 1. Strategic Advantage Agree: 70.75% NAND: 20.26% DA: 6.55% | 1. Competitive Advantage | 1 | 94.6 | 0.6 |
| | | 2 | 77.2 | 2.7 |
| | 2. Attract Investment | 3 | 77 | 3.1 |
| | | 4 | 51.2 | 10.6 |
| | | 5 | 38.6 | 20.7 |
| 2. Benefit to the Creator/ Acquirer Agree: 52.55% NAND: 29.90% DA: 14.71% | 3. Intellectual Capital | 8 | 78.3 | 5.4 |
| | | 9 | 59.9 | 7.7 |
| | | 10 | 51.6 | 15.7 |
| | 4. Human Capital | 23 | 83.5 | 3.3 |
| | | 24 | 13.2 | 51.2 |
| | | 25 | 79.1 | 3.3 |
| | | 26 | 32.1 | 32.4 |
| | 5. IPR | 40 | 37.4 | 17.5 |
| | | 41 | 29.2 | 14.4 |
| | 6. Loss if used by Competitors | 47 | 60.7 | 13.2 |
| | | 48 | 62.6 | 8.3 |
| 3. Business Process Improvement Agree: 70.46% NAND: 20.46% DA: 6.7% | 7. BPI | 16 | 39 | 18.2 |
| | | 17 | 85.4 | 2.9 |
| | | 18 | 83.3 | 3.5 |
| | 8. Work Instructions | 19 | 69.3 | 7.5 |
| | | 20 | 47 | 11.3 |
| | 9. Problem Solving | 21 | 83.9 | 2.9 |
| | | 22 | 84.1 | 2.1 |
| 4. Cost of Creating and Communicating Knowledge Agree: 36.61% NAND: 28.76% DA: 32.54% | 10. Transfer of Knowledge | 11 | 22.6 | 55.9 |
| | | 12 | 26.7 | 39.5 |
| | | 13 | 17.9 | 53.7 |
| | 11. Market Awareness | 14 | 55.1 | 10.7 |
| | | 15 | 72.6 | 6.3 |
| | 12. Cost of Communicating Knowledge | 27 | 23.2 | 51.1 |
| | | 28 | 24.8 | 45.1 |
| | | 29 | 25.7 | 43.4 |
| | 13. Cost of Generating New Knowledge | 30 | 42 | 21.1 |
| | | 31 | 29.2 | 29.8 |
| 5. Outputs in the form of Products and Services Agree: 78.37% NAND: 16.56% DA: 13.35% | 14. Cost of New Products | 32 | 82 | 3.1 |
| | | 33 | 79.7 | 3.1 |
| | 15. Cost of New Services | 34 | 77 | 4.4 |
| | | 35 | 77.9 | 3.6 |
| | 16. Cost in Improving Products | 36 | 80.4 | 3.5 |
| | | 37 | 77 | 3.5 |
| | 17. Cost in Improving Services | 38 | 79.7 | 1.9 |
| | | 39 | 74.1 | 3.6 |
| 6. Benefits to the Knowledge User Agree: 66% NAND: 20.24% DA: 11.48% | 18. Number of Users | 6 | 73.1 | 10.7 |
| | | 7 | 59.5 | 15.4 |
| | 19. Monetary Benefits to the Org. | 42 | 73.1 | 8.8 |
| | | 43 | 73.9 | 7.3 |
| | 20. Personal Benefits | 44 | 38.8 | 24 |

| | | | | |
|---|---|---|---|---|
| | | 45 | 60.7 | 10 |
| | | 46 | 75 | 6.1 |
| 7.<br>Time Period Involved<br>Agree: 36.3%<br>NAND: 36%<br>DA: 25.03% | 21. Individual Time Spent in Creating Knowledge | 49 | 39.3 | 24.8 |
| | | 50 | 35.7 | 23.8 |
| | 22. Total Time Spent in Creating New Knowledge | 51 | 37 | 26.9 |
| | | 52 | 33.2 | 24.6 |
| NAND = Neither agree nor disagree<br>DA = Disagree | | | | |

taken from earlier researches were reported good reliability measure. The items were discussed with industry experts and academicians to validate them for the current study. It was unanimously decided that all items confirm to the face validity and criterion validity. Since each factor was measured via multi-item constructs, an item analysis and factor analysis was conducted to validate the scales.

Convergent validity, the degree to which multiple attempts to measure the same concept is in agreement, was evaluated by the item-to-total correlation; meaning, the correlation of each item to the sum of the remaining items. Majority of the items has convergent validity greater than 0.5, however few has less than 0.5 but they are with other items having greater than 0.5 values in the same factor therefore they can be neglected. Finally, the discriminant validity was assessed via factor analysis by items for each variable was loaded onto single factor. Again higher than 0.5 values confirms the unidimensionality among the items.

### D. Analysis Approach

The values of correlation analysis among the 52 items remained between 0.70 and -0.009 with majority lying between 0.01 and -0.02 indicating no significant correlation among the concepts present in the items. The correlation was again applied after the first order factor analysis on the factors. No value was over 0.488 indicating lack of correlation among the 12 variables. The multicollinearity was applied to check if the data is appropriate for the study. All the 52 items have Variance Inflation Factor (VIF) less than 3.1 and tolerance value greater than 0.30. In the second phase, the analysis was repeated on the results of first order Factor Analysis. The result shows values of VIF for all the factors were less than 1.5 with tolerance values greater than 0.7, both within acceptable limits (Table 2). These correlations, coupled with the results from the VIF, tolerance, indicate that multicollinearity is not a serious problem for the proposed model (Neter, Wasserman and Kutner, 1985). Overall, the gathered data satisfied the basic required conditions and were appropriate for further analysis.

### E. Results from Data Analysis

The –2log likelihood value demonstrate that the overall model was significant at a level of 0.001. Additionally, the pseudo R-square values for McFadden, Cox, and Snell, and Nagelkerke were 0.730, 0.966, and 0.976 respectively. The larger values of the pseudo R-square explain that the model

proposed in this study fits the collected data. Items having Communality value 0.50 or greater are considered having variances and are considered for further analysis. Using principle component analysis for extraction, only 17 items have Eigen values greater than 1.00, this makes the cumulative percentage greater than 62%. However first 12 items makes the cumulative percentage 51. 694. Higher values of Chi Square shows strong relationship of each item with the basic concept i.e., value of knowledge. From principle component method using varimax rotation 12 components were finalized and loading was performed. Out of 12 components, 2 components have less than 3 loadings, however their loading values are greater than 0.50, therefore were not ignored. All the factors are related to the value of knowledge at significance levels of 0.05, 0.01, and 0.001. However, Resource and Challenge were found to be most significantly related to the value of knowledge (7 loadings). They are followed by Innovation (six loadings), Improvement, User, and Capacity Building (five loadings), Competitive Advantage (4 loadings), Intellectual Property Right, and Personal Gain (3 loadings), Business Process, New Knowledge, and Organization Development (2 loadings). Since all the factors that are covered in the hypotheses were found to be related to the value of knowledge, the entire hypotheses were supported.

The second order factor analysis was performed using principle component method using varimax rotation and twelve factors converged into two higher order factors (Table 2) namely Futuristic and Contemporary. It is very interesting to note that the two identified factors, Futuristic and Contemporary, are much diversified and covers all the 12 variables from first order factor analysis.

## V. DISCUSSION

The result of the first order of factor analysis produced twelve factors that were found impacting on the value of knowledge. Resource and Challenge - exert significant impact on the value of knowledge. The value of knowledge is principally dependent on the resources consumed in creating or acquiring new knowledge. Since time (Tien, 2000) and money (Ye, Nakakoji and Yamamoto, 2007) both are critical resources, higher the investment/cost, higher return would be expected. As a result the value of that knowledge would be impacted accordingly. Transferring knowledge from one

Table 2: Rotated Component Matrix – Second Order Factor Analysis, Collinearity Statistics, and Probability

| Factors from First Order | p-value * | Factors from Second Order | | Collinearity Statistics | | Item Numbers |
| --- | --- | --- | --- | --- | --- | --- |
| | | Futuristic | Contemporary | Tolerance | VIF | |
| Improvement | 0.000 | 0.724 | | 0.701 | 1.427 | 37, 36, 39, 38, 2. |
| Innovation | 0.000 | 0.714 | | 0.717 | 1.395 | 33, 32, 22, 34, 35, 21 |
| Organization Development | 0.000 | 0.541 | | 0.813 | 1.230 | 4, 23. |
| Capacity Building | 0.000 | 0.518 | | 0.863 | 1.159 | 9, 15, 8, 19, 5. |
| Business Process Imp. | 0.000 | 0.497 | | 0.876 | 1.142 | 17, 18, 20. |
| User | 0.000 | 0.436 | | 0.855 | 1.169 | 7, 3, 6, 25, 10. |
| New Knowledge | 0.000 | 0.403 | | 0.889 | 1.125 | 1, 14. |
| Competitive Advantage | 0.000 | 0.353 | | 0.859 | 1.164 | 47, 48, 43, 42. |
| Challenge | 0.000 | | 0.781 | 0.814 | 1.228 | 12, 27, 28, 29, 11, 13 24. |
| Resource | 0.000 | | 0.769 | 0.791 | 1.265 | 51, 52, 49, 50, 31, 30, 26. |
| Intellectual Property Right | 0.000 | | 0.626 | 0.763 | 1.310 | 41, 40, 16. |
| Personal Gain | 0.000 | | 0.581 | 0.711 | 1.407 | 45, 46, 44. |
| Eigenvalue | | 2.991 | 1.775 | | | |
| Variance explained | | 24.926 | 39.718 | | | |

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 3 iterations
* p<0.05; p<0.001; p<0.001.

entity to another is difficult and challenging that often results in loss of contents or context or both (Jasimuddin and Zhang, 2011) hence there is a risk of information loss. Higher the challenge, higher would be the risk of loss, so higher will be the value of knowledge.

Second most significant factor is Innovation. Analysis and interpretation of new knowledge about customers demand are driving force behind the technical progress and innovation in product design innovation (Guo et. al., 2010) and creation of new value added services to the customers (Lee & Ali, 2010).

The third in significance are factors: Improvement, User, and Capacity Building. Product improvement, key to business success, is a deliberate effort to enhance product's functionality and benefits (Lee & Kang, 2007). The Theory of Human Capital states that investment in people through training, education, and counseling brings performance improvement (Nafukho, Hairston & Brooks, 2001). Thus the Users intellectual capability increases that results in increase in organizational Capacity Building.

Fourth in significance is Competitive Advantage. A new knowledge that gives strategic advantage to the company is very valuable. Measures like copy right patent is one way of securing that knowledge and prohibiting others from copying or misusing the knowledge (Hjerpe, 2003).

Fifth in significance are factors: Personal Gain, Business Process, and Intellectual Property Right. Personal benefits like monetary, recognition, diploma, or promotion are strong motivating factors that drive an individual for hard work and creating new knowledge. For business survival, continuous improvement in the Business Process processes is essential. It is important to secure critical scientific knowledge for business advantage. Intellectual Property Right helps in

securing the newly developed scientific knowledge to ensure safeguard from misuse.

Finally the two least significant factors: Organizational Development, and New Knowledge. Organizational development is the practice of changing people and organization for positive growth. This is possible only through knowledge. The launch of new product/service would mean organization has acquired or created new knowledge. However, market acceptability of that product/service and profit generation would define the success of that new knowledge.

The second order factor analysis was performed to come up with more meaningful result. Twelve factors were integrated into two factors namely: 1. Futuristic and 2. Contemporary.

The 'Futuristic' factor includes all the variables that are focused towards the future business of the firm. This includes: Improvement, Innovation, Organizational Development, Capacity Building, Business Process Improvement, User, New Knowledge, and Competitive Advantage. The eight out of twelve variables in Futuristic factor means the value of knowledge for the organization is more dependent on the future benefits from the knowledge. Higher the benefit, the more valuable would be the knowledge. When future benefits subside, the knowledge would lose its value. Therefore, organizations can use 'Futuristic' as a factor to estimate the worth of their knowledge asset.

The 'Contemporary' factor includes all the variables that are associated with present day issues. This includes: Challenge, Resource, Intellectual Property Right, and Personal Gain. This factor is less impactful as compared to Futuristic factor on the value of knowledge because it contains only four variables. If the present day issues are

serious, the knowledge would be valued high and vice versa. This is more related to the current activities like R&D, transfer of knowledge, securing of knowledge, and personal gain. These all are short term or current issues faced by the organization. Therefore organizations can estimate the value of their newly created knowledge on the basis of 'Contemporary' factor.

Close scrutiny reveals that the two factors: Futuristic and Contemporary acts opposite in direction. Higher the 'Futuristic' impact, higher would be the benefit hence more would be the value of knowledge. However, higher the 'Contemporary' impact would mean higher the cost hence benefit would decrease.

### A. Knowledge Value Life Cycle (KVLC)

The KVLC has two parts: Knowledge Value Wheel (KVW) and Knowledge Value Line (KVL). The KVW contains the two factors of valuing knowledge i.e., Futuristic and Contemporary. In the proposed model, the two factors are connected with each other. Their internal factors from factor analysis level 1 can be seen inside. The wheel moves in time from left to right, thus draws the Knowledge Value Line (KVL) (Fig. 1).

If the factors are strong, it will inflate the wheel, thus increases the value of knowledge. And when these factors become weak, the wheel shrinks, results in the value of knowledge to fall. If the futuristic factor is strong like competitive advantage, the knowledge gives the organization some competitive advantage over its competition, the factor will exert itself towards outside, making the wheel to enlarge. Similarly, if contemporary factors like resource becomes costlier, it will expand the wheel outward thus the wheel becomes big.

There are some possibilities that some of the factors may lose their impact while others gain strength, resulting the wheel to remain in size. And as the wheel moves in time from left to right with its inflation or deflation, the value of knowledge line gets drawn.

Instance, where the value of knowledge is continuously increasing, the KVL will appear to be going up from left to right. And when the value of knowledge is decreasing, the KVL will appear to be going down (Fig. 2).

### VI. CONCLUSION, CONTRIBUTION AND LIMITATION OF THIS STUDY

This study presented two factors: Futuristic and Contemporary, which contain all the identified 12 factors of valuing knowledge. The results of this study will assist in better understanding of knowledge and its value to interested individuals. Second, organizations would be able to identify reasons for increase/decrease in worth of their organization. This may lead to measures that will help organizations to maintain their competitive position in the market. Third, by applying these factors, future prospects of new knowledge can be estimated. Fourth, organization can classify its knowledge assets among the twelve factors for better management. For instance, Improvement and Innovation related knowledge need to be safeguarded as they can be used with minimal or no changes by other organizations. However, knowledge related to Organizational Development, Capacity Building, and Business Process Improvement is more specific to particular organization and may not be used by others with ease. Similarly not all would be the user of every knowledge hence some knowledge would be specific to industry and requires safeguard from competitors. Knowledge related to Challenge and Resource can be discussed openly to get assistance from others having experiences of overcoming similar difficulties. Knowledge related to Intellectual Property Right are specific to organizations should be broadcasted to gain mileage and prevent possible misuse.

There are some limitations in this study as well as opportunities for future research. First, this study comprise of cross sectional research. Longitudinal research overtime is suggested to track changes in the value of knowledge by the impacts of these factors. Second, the respondents were the representatives of organizations operating in Pakistan, however the findings are equally applicable to organizations worldwide regardless of their nature of business. It is suggested that similar sort of study may be repeated in other parts of the world to replicate the findings. One potential research area with respect to this study would be the formulization of inter-relationships between the factors in order to evaluate the impact of one factor on other factor. This may lead to develop a mathematical equation for calculating the value of knowledge.
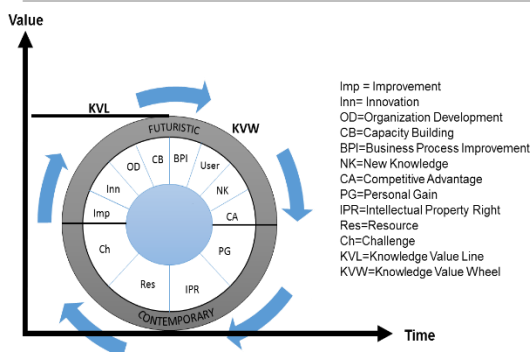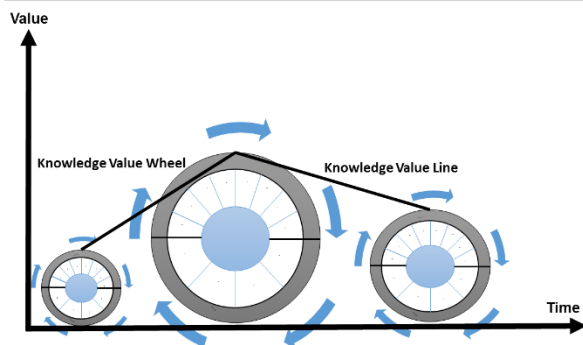


Figure 1: Knowledge Value Life Cycle (KVLC)

Imp = Improvement
Inn= Innovation
OD=Organization Development
CB=Capacity Building
BPI=Business Process Improvement
NK=New Knowledge
CA=Competitive Advantage
PG=Personal Gain
IPR=Intellectual Property Right
Res=Resource
Ch=Challenge
KVL=Knowledge Value Line
KVW=Knowledge Value Wheel



Figure 2: KVLC When the Value of Knowledge Increasing

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