

# ASSESSING THE VIABILITY OF VIRTUAL WORK ARRANGEMENTS - A DIAGNOSTIC TOOLKIT

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***Abstract:** The Covid-19 pandemic has seen the world scrambling to find the most efficient ways of working virtually without diluting business objectives. The industry is trying to future-proof itself by figuring out which business processes and activities should be virtualized and what percentage of the workforce should continue to operate virtually without any loss in organisational and individual performance. Questions abound on whether the future of work should be entirely virtual, or a hybrid and if so, what is that 'secret formula' for the best mix, does it vary for different types of organisations etc. Currently the answers are driven by intuition and are therefore risk prone. This paper outlines a conceptual model for a Virtual Work Viability Toolkit, which will not only aid such decisions but also serve as a diagnostic tool for organisations to figure out where exactly there are bottlenecks with respect to virtual work and how to fix them.*

***Keywords:** virtual work, knowledge transfer effectiveness, transaction cost, knowledge worker performance, virtual work viability index, virtual organization.*

## **Introduction**

Globalization has seen the proliferation of geographically dispersed organizational entities. These entities could either be part of the same organization or belong to different organizations that collaborate with each other towards achieving common business objectives. This phenomenon has generally come to be known as the Virtual Organization (VO) (Davidow& Malone, 1992). While these virtual connections have been in existence for many years, the recent Covid-19 pandemic has pushed just about every organisation and institution to embrace the virtual mode in as many of their activities as possible. It has catapulted the need to build robust systems for virtual work and virtual inter and intra-organizational processes as the top priority of a beleaguered industry. Organizations are looking at virtual work arrangements, not merely as risk mitigation initiatives during such crises but are actively looking at whether these can be institutionalized to build a more environmentally sustainable post pandemic world. Hence there is a need to examine it as a strategic option after a careful examination of its sustained viability.

While virtual work is generally discussed from an employee's perspective, a deeper look makes it obvious that it entails ensuring smooth inter-connections across multiple entities

that could be either within or outside the organizational boundary. Further, virtual linkages can be with reference to the supply chain or customer dimensions in addition to those with employees, associates and business partners. In the context of moving businesses to a virtual mode, all these dimensions will need to be addressed. For this paper, we use a definition of the VO that encapsulates the entire gamut of potential virtual work arrangements (Shekhar, 2006):

*A VO is any organization with non-co-located organizational entities and resources, necessitating the use of virtual space for interaction between the people in these entities to achieve organizational objectives.*

Decisions on the sustainability of virtual arrangements need to be driven not just by feasibility, but more by considerations of economic viability. Ensuring there is no drop in organizational or employee performance in such virtual arrangements encompasses issues much beyond merely providing the right technology. A post facto examination of individual performance or organizational outcomes does not serve to provide a granular view that can aid calibrated decision-making with respect to adoption of virtual options. Therefore, a strong need has emerged to be able to monitor the effectiveness of virtual arrangements, through an objective mechanism in a systematic manner, rather than by judgment or intuition.

### **Research Questions and Objective**

This paper evolves a conceptual model (as the basis for a Virtual Work Viability Toolkit) through a set of propositions that can serve to answer the following questions:

- (1) How should organizations decide whether it is viable to perform business functions or activities virtually?
- (2) Who should continue to work virtually and to what extent?
- (3) How can one assess the likely impact of virtual work arrangements on performance?
- (4) If virtual work outcomes are not satisfactory, how does one diagnose and fix the problem?
- (5) If one waits till the task gets completed to take a call on whether virtual work has been effective, it is probably too late. If the results are adverse, the damage is already done. Is there any parameter based on which an assessment can be made right at the very beginning? If so, is there a tool to measure that parameter, irrespective of the nature of the business or task on hand?

### **Determinants of Virtual Work Viability**

At the individual level, knowledge worker performance is critical to organizational outcomes. (Any employee or individual who requires any form of information or knowledge to complete her task is referred to in this paper as a 'knowledge worker'). A virtual arrangement can be seen to be viable based on whether it is able to achieve the required outcomes of an organizational activity. In this paper we call it Virtual Work Viability (VWV). The success of an organizational activity is predicated on an

aggregated view of the performance of knowledge workers engaged in executing that activity. Hence, we derive the following proposition:

**Proposition 1: Knowledge worker performance is a key determinant of Virtual Work Viability**

However as highlighted in the last research question, there need to be mechanisms for early assessments instead of waiting for overall performance outcomes. Can such parameters or indicators be identified? This paper suggests that there is indeed such a parameter. Fundamental to the success of virtual organizations and knowledge worker performance, is the extent of seamless knowledge transfers across dispersed geographic locations. Regardless of the context in which the work is being performed virtually - whether it is in the context of employees in organizations (in either manufacturing or services sectors) or students in educational institutions, the one fundamental indicator of viability of the virtual work format is effectiveness of the knowledge transfer, which in turn greatly influences the performance of the individual. E.g., How well has an employee performed her job based on virtual interactions, how successfully has information been shared and sales achieved when a customer interaction has been virtual instead of face-to-face, how effectively has a student learnt a new concept when taught virtually etc. In an empirical research done by this author across 1207 knowledge workers, it turned out that Knowledge Transfer Effectiveness (KTE) alone was able to account for 68% of the variability in performance! Hence it would be important to be able to assess the success of knowledge transfer since it is one of the strongest indicators of Virtual Work Viability.

It is also very important to remember that it is not enough if the work done virtually is as effective as that in a physical mode. One also must consider at what cost this has been accomplished. Transaction cost theory (Williamson, 1979) offers an economic perspective to such decisions. In the VO context where collaborative working is critical, the ease or otherwise of knowledge transfer becomes an important component of transactions costs.

One of the key differentiators between virtual and non-virtual work arrangements is the cost of knowledge transfer across locations. Information Technology (IT) is often seen as an important enabler for reducing transfer costs. Very often people make the mistake of assuming that the primary cost incurred while moving to virtual work is the cost of technology. This is very far from the truth as we will see later. It leads us to the following proposition:

**Proposition 2: Knowledge transfer effectiveness and associated costs are a key influencer of Virtual Work Viability**

So, a virtual work arrangement can be seen as a viable alternative in any organizational context, if the outcomes or performance equal or exceed that of the non-virtual arrangement, considering the transaction costs involved. While KTE is a very significant determinant of outcomes, knowledge transfer costs account for a very significant part of

the overall costs associated with virtual work.

The question that arises next is how organisations should measure VWV. A generic model for the same needs to be context agnostic and customizable to different virtual arrangements and entities, in addition to being comparable across these. This paper proceeds to develop a VWV Index. Given that a critical determinant of VWV is KTE, it identifies the three important elements of KTE as Knowledge Availability (from multiple locations), Knowledge Assimilation (through training), and Knowledge Application. Particularly in virtual environments, these are important influencers of both transfer costs and transfer effectiveness. Knowledge transfer costs could vary significantly depending on a variety of factors including the characteristics of the entities or knowledge workers involved, the characteristics of knowledge itself, level of technology facilitation, the characteristics of the activity in question (whether it is a supply chain linkage, service delivery, customer facing activity etc.) and the location (within or outside the organizational boundary and whether they are co-located or remotely located). Identifying bottlenecks and associated costs in each of these would provide a more diagnostic view of the process, their impact on knowledge worker performance and therefore a more objective assessment of the viability of virtual work arrangements.

### **Developing a VWV Index Through an Analysis of KTE**

To developing a model for assessing KTE based VWV Index, it is important to capture the potential effects of geographic dispersion by incorporating locationality. Any business activity in a VO might typically involve multiple relationships and simultaneous interactions with multiple entities. Hence it would be important to have a mechanism to assess KTE at a level of granularity that recognizes each of these entities separately. Given the pervasiveness of deployment of information technology in organizations, it is important to bear in mind that co-located knowledge workers also interact and perform their business functions virtually. This makes it important to understand issues of knowledge transfer both within collocated knowledge workers and remotely located entities. We begin by identifying the sub-processes in knowledge transfer and incorporate the location dimension.

#### ***Knowledge Availability***

We identify the first sub-process of knowledge transfer as Knowledge availability (K-Avl). For the recipient, K-Avl is dependent on the willingness and ability of the source to supply the required inputs. Knowledge that is transmitted could be either structured information or unstructured inputs from the members of the source location. Therefore, knowledge availability (K-Avl) can be seen to be an indicator of whether relevant information and inputs are made available in a manner that is most suitable for the members in the recipient location to carry out their tasks. The costs associated with K-Avl can vary based on whether the virtual arrangement is across one or more organizations or locations. Besides costs of technology and related infrastructure, it could include cost of content availability, HR interventions to build trust etc. Therefore, in managing transaction costs with respect to knowledge transfers, the cost of knowledge

supply or knowledge availability to the recipient is a key consideration. This leads us to the following two propositions:

Proposition 3a: Knowledge availability influences knowledge transfer effectiveness  
And as a corollary:

Proposition 3b: Cost of knowledge supply is an integral constituent of knowledge transfer costs.

### ***The influence of distance on knowledge availability (K-AvI)***

One of the key characteristics of a VO is geographic dispersion of organizational entities. While earlier research suggested that distance by itself influenced project outcomes, more recent research has pointed to the fact that dispersion must be seen in conjunction with other forms of ‘distance’ between people that include knowledge level distance, cultural distance, temporal distance, organizational distance and so on (Shekhar, 2016).

While studying knowledge transfers, the extent and nature of distances within a location or within a single organization could be different from the distances across locations and organizations. The impact of these distances on KTE, are likely to be different. Due to this, transfer effectiveness may not be homogeneous across the entire transfer process, despite common or similar facilitators like technology, infrastructure, and processes. The knowledge flow from source to sink, needs to be broken down into knowledge-flow segments that capture the locational aspects of the transfer. The overall effectiveness of transfer will depend on the cumulative impact of each of these ‘segments’ of knowledge transfer, each of which could be influenced to varying extents by the different distances involved in that segment. Therefore, the transfer process needs to be viewed and analysed in terms of its constituent segments instead of as a single-point assessment at the end of the process. Therefore, knowledge availability (K-AvI) to any knowledge worker can be viewed as a combination of knowledge transferred from multiple distant location(s) (K-AvI<sub>DL</sub>) and knowledge transferred within the current location (K-AvI<sub>CL</sub>).

$$KAvI = f(KAvI_{DL1}, KAvI_{DL2}, \dots, KAvI_{DLn}, KAvI_{CL})(1)$$

Hence in the context of VOs, assessing knowledge transfer costs and effectiveness must necessarily consider the costs of knowledge supply from multiple locations and entities. This brings us to the next set of propositions:

Proposition 4a: Overall knowledge availability in a VO is a function of knowledge availability from different entities and / or locations that a knowledge worker needs to interact with.

Proposition 4b: Knowledge supply cost needs to be analysed with respect to each knowledge-flow segment from each of the locations and / or entities that a knowledge worker could be interacting with.

### ***Knowledge Assimilation***

It is necessary to distinguish between knowledge that is available and 'usable knowledge'. The recipient needs to possess the requisite skill levels and the contextual understanding of the knowledge transferred to understand and assimilate the same. Knowledge is taken as transferred when learning takes place and when the recipient understands the intricacies and implications associated with that knowledge so that it can be applied. In this paper we refer to this process as Knowledge Assimilation (K-Asm). We suggest that a key determinant of how much of the available knowledge is applied or used is based on the extent of 'knowledge assimilation'. This brings up the next proposition:

Proposition 5: Knowledge assimilation influences KTE

Knowledge assimilation can be facilitated through appropriate training programs during the KT process. There is obviously a cost associated with training. So, if an employee must work remotely, it is not enough for the organisation to equip her with the necessary technology. Necessary training also needs to be provided to make a seamless move to a virtual environment. The quantum and nature of training required, and the associated costs would vary based on several factors like the knowledge gap between the source and recipient, complexity, and absorptive capacity of the recipient. These lead us to the next two propositions:

Proposition 6a: Training is an important facilitator for knowledge assimilation.

Proposition 6b: Training cost or the cost of knowledge assimilation is an integral component of knowledge transfer cost.

### ***Knowledge Application***

Knowledge Application (K-App) represents the demand side dimension of the transfer process. The process of knowledge application determines whether the transmitted knowledge is put to effective use by the recipients to achieve the desired goals. The degree to which the knowledge supplied by the source has been utilized or applied to achieve the intended objectives will be indicative of how effective the knowledge transfer has been.

An important difference in viewing virtual work arrangements as a sustainable organizational strategy instead of a short-term alternative is that it should at the very least be comparable to current levels of effectiveness and performance within the organization, besides being able to lead to improved outcomes later. The knowledge needs to be contextualized to be used effectively. Hence Knowledge Adaptation becomes necessary for successful transfer of knowledge. For the VO to be viable in the long run there needs to be a sustained level of improvement and value addition. Innovation has seen to be an important enabler of the same. Research also suggests that socialization, face-to-face interactions, and informal meetings could be enablers of innovation. A key concern that peoples have is whether virtual work will stifle innovation and this issue needs to be addressed. It would be important to understand whether there are any opportunity costs

associated with remote work arrangements on account of a discernible drop in the propensity of knowledge workers to innovate on account of reduced levels of face-to-face interactions. Hence the dual aspects of adaptation and innovation are important components of the process of K-App. This leads us to our final two propositions:

Proposition 7a: Knowledge application influences KTE

Proposition 7b: Adaptation and Innovation are important elements of K-App. A drop in these represents an opportunity cost for the organisation.

### ***Summarizing the VWV Index using the KTE Model***

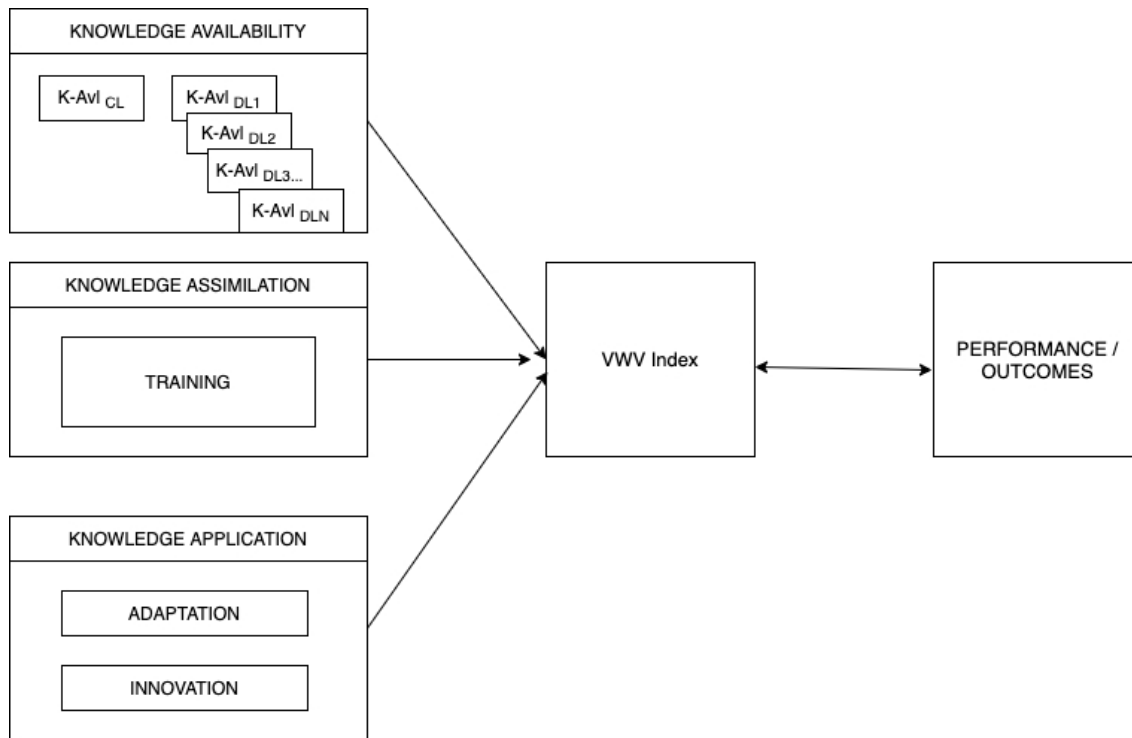
We have conceptualized a model for KTE using three distinct sub-processes viz., Knowledge Availability (K-Avl), Knowledge Assimilation (K-Asm) and Knowledge Application (K-App), which trace the movement of knowledge from source to sink:

$$KTE = f(K-Avl, K-Asm, K-App) \quad (2)$$

In dispersed work arrangements of a VO, the knowledge transfer could occur from multiple distant locations as well as within a collocated team. The ease and effectiveness of transfer could vary along each of these transfer paths. A combination of the process and locational dimensions (represented by equations (2) and (1) respectively), gives us a representation of Virtual Work Viability in organizations as under:

$$VWVIndex = f(K-Avl_{DL1}, K-Avl_{DL2}, \dots, K-Avl_{DLn}, K-Avl_{CL}, K-Asm, K-App) \quad (3)$$

The costs associated with each of the above elements will impact the overall costs of knowledge transfer. This would include the cost of supply of the knowledge from multiple locations and the cost of assimilation by the recipient through appropriate training mechanisms. It also considers opportunity cost if any, to the organization on account of lower levels of adaptation and innovation that are critical for long-term sustainability of virtual arrangements. Such a representation accommodates the fact that in a VO there could be knowledge transfers from one or more distant locations or entities with varying degrees of effectiveness and associated costs. It would become important to separately assess how effective the knowledge transfer is from each of the organizational entities that are linked through such an arrangement to be able to assess the viability of the virtual linkages. Such a composite representation of KTE is likely to be a sound predictor of knowledge worker performance and is therefore used as the VWV Index. When aggregated at an organizational level it can give a comprehensive idea of the viability of virtual work. Figure 1 provides a diagrammatic representation of the model.



**Figure 1: The Conceptual Model**

**Discussion and Contributions:**

This paper addresses the question of how organizations should decide whether it is viable to perform business functions virtually. It suggests that virtual arrangements can be viewed as a viable alternative if, firstly, the outcomes (be it at the knowledge worker, business function or organizational level) are comparable to or exceed those in collocated arrangements. But secondly, and more importantly, the benefits of performing organizational activities virtually through non-co-located entities outweigh the costs associated with the same.

The paper evolves the conceptual model underlying a Virtual Work Viability toolkit developed by the author that has translated this model into a set of measurement instruments that can be customised to any organisational environment. This toolkit has been effectively deployed by the author in multiple organisations to provide valuable insights to aid strategic decisions on virtual work.

Often organizations tend to think that taking care of technology enablement and allied resources along with the necessary cyber security measures, is largely what is required to facilitate virtual work. This paper highlights the fact that besides these, they must recognize that there could be other significant costs several of which have been identified. These are likely to vary across organizations and across different kinds of virtual linkages within the same organization. A careful examination of these with respect to each of these sub-processes could give organizations a useful roadmap. Facilitating the first sub-process K-AvI, may entail ensuring that knowledge is structured and encapsulated in



a manner that makes it easy to be used virtually, educating the employees to ensure timely transmission of required information, building trust and so on. To facilitate the second sub-process viz., K-Asm in the new work arrangement, organizations may need to customize appropriate training programs based on varying requirements and capabilities of knowledge workers. Finally, organizations might have to work towards minimizing or eliminating potential opportunity costs associated with K-App. Given the fact that the move to virtual work formats means having to forego some obvious advantages of co-location, organizations may need to provide adequate collaboration tools and mechanisms to ensure necessary levels of socialization within knowledge workers that is conducive to adaptation and innovation.

The Virtual Work Viability model when analysed with respect to each of the individual dimensions can offer useful insights for possible managerial action. For instance, there could be a particular distant location which exhibits low levels of K-Avl. This could prompt a causal analysis on the same. On the other hand, if K-Avl is reasonably high from all locations, yet, the performance is not adequate, an analysis of K-Asm could point to the need for additional training support.

This model is potentially customizable at multiple levels. Often virtuality could meet several objectives at the knowledge worker level (like flexitime, ease of commuting, productivity etc.), while not necessarily being able to meet all the organizational objectives. In such cases performance outcomes can be operationalized considering multiple objectives. We thus have a model that is sufficiently generic so that it is amenable to be contextualized and customized to incorporate variances across organizations in the knowledge transfer process on account of different types of activities with varying levels of inter and intra locational interdependence on one hand and the intended project or organizational objectives on the other.

Finally, organizations appear to be relying on intuition to decide on important aspects of virtual arrangements like what percentage of employees should continue to work from home after the present crisis. ("Gartner CFO Survey Reveals 74% Intend to Shift Some Employees to Remote Work Permanently", 2020). However, the expected proportion of such employees varies across organizations and the basis for the same is unclear. The conceptual model evolved here could provide some useful inputs at two levels. First it helps to examine which are the knowledge workers who have been able to demonstrate higher levels of performance and a high VWV Index. Such people offer themselves as possible candidates for continued virtual work. The second is through a more nuanced understanding of this model. In cases where the results of VWV Index are moderate to low, the individual knowledge flow segments need to be examined. If K-Avl is low from a particular entity or location and a pattern emerges across multiple knowledge workers or functions, it could point to the need to aggregate such entities to operate out of a co-located group. A careful study of these trends over a period could also provide useful insights into potential re-structuring of jobs where the more arduous knowledge-flow functions or activities are encapsulated into a separate job function. Hence the model could provide a more objective way on deciding the partitioning of jobs into virtual and co-located ones.

Organizations the world over, have hurriedly moved to virtual work formats on account of the Covid-19 pandemic. Enablers such as the VWV Index based on carefully researched conceptual models can help organisations decide how best to make this a strategic option that is viable in the long-term.

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