Knowledge Transcendence: Strengthening Knowledge Management Efforts on Modeling Transdisciplinary Knowledge using Artificial Intelligence

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Summary
Global operability in multidimensional capacities and the emerging technologies such as bigdata, cloud computing and IoT, produces large amount of heterogenetic knowledge units, with high velocity and variety, thus possessing extremely dynamic properties. Therefore a need arises to develop a mechanism to access these heterogenetic knowledge units spread across global knowledge repositories. This knowledge however can only be beneficial in pursuit of value creation if it is rendered into homogenetic knowledge, which shall be linked with both, contextual and shareable application domains. The paper presents a strategic approach for solving the emerging challenges in knowledge management w.r.t knowledge heterogeneity using artificial general intelligence.

Key words:
Knowledge Heterogeneity, Transdisciplinarity, Sustainability and Knowledge Transcendence.

1. Introduction

With the advancement in technology, there has been an equally dynamic pace of knowledge development and the inclination of global concerns towards knowledge management. Furthermore, utilization of this knowledge for value creation, rather rendering the scattered knowledge into useful one has brought the development of knowledge management and corresponding technological domains. In the current regime, we are dealing with knowledge spread across different layers of organizational hierarchy, its repositories and the human capital at large. Rather, knowledge is not only vested within organizations and its resources, but across scientific domains (both pure and social), cultures, experiences and other aspects of human concern.

In recent years, knowledge has been recognized as the most pivotal aspect for organizational value, wherein, the international think tanks and policy development bodies such as ISO has made it an obligation for global concerns to recognize knowledge as a resource (Wilson & Campbell, 2016). Thus, by recognizing knowledge as a key driver of organizational competitive advantage and the most needful resource of the current global regime, organizations have been adopting various technologically equipped systems for harnessing this knowledge and utilizing it for projective development (Kiniti & Standing, 2013).

All these multidimensional, multi-locational and multifaceted aspects of knowledge makes it extremely heterogenetic. Herein, the heterogeneity of knowledge is refereed as the diversity of knowledge in both conceptual and functional perspectives. While the most challenging properties of concern pertaining to this knowledge is its storage, sharing and evolution.

From the technological perspectives, knowledge has been studied as a wide range of resourceful patterns and analysis generated by the emerging technologies and their respective platforms, ranging from web 2.0 to cloud computing and internet of things (IoT). While the technological paradigm is moving from mobility era to the ubiquitous computing era, it is foreseen that these technologies shall be producing enormous amount of data streams and traffic ranging into zettabytes. This versatile and volatile data shall be huge enough to be stored and manipulated for utilization and deployment across various facets of human operability.

The enormous yet dynamic data production has given rise to a new regime of concern i.e. big data, wherein, it is extremely important to deduce the true value of data, as to which and how much of the collected data actually needs to be stored and manipulated for future development. That is not where the concern ends, but rather it brings along further concerns mentioning privacy and security, access and sharing, storage and processing, analytical issues, skill requirements and technical challenges to be worth consideration (Katal, Wazid, & Goudar, 2013). Furthermore, the ample of data collected through various technological platforms could only provide the trends based on the present state of affairs, which is unlike the natural knowledge development perspective, i.e. it should generate new knowledge and evolve over time. Thus, new knowledge generation is a pursuit for technological development in the current regime. This pursuit is currently under practice across a wide range of disciplines, prominently in the health sciences, wherein, it is foreseen that linking various knowledge health repositories, diagnostic patterns and research could provide new

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pathways for the improvement and development in medical science.

Furthermore, another regime looking forward towards combining knowledge from various aspects, ranging from disciplines to organizations and social networks, is sustenance science and transdisplinary research and development. This school of thought has emerged out of the same concern, i.e. knowledge heterogeneity. Herein, with the rapid advancement in global operability, it is being widely accepted that it can only be possible to sustain the current and the emerging state of affairs, only if knowledge is shared across disciplinary, territorial, and organizational boundaries etc.

With the perspectives over knowledge sharing across knowledge domains, there are other challenges associated. Herein, overcoming redundancy in the cross-disciplinary context is an extremely important aspect of consideration. Redundancy if linked across various knowledge bases could yield extremely fruitful results and is even being exercised by domains such as biomedical. There exist knowledge bases (KBs) where broadly covered and detailed knowledge is existing, however, there still are ambiguities due to lack of structural information from the originating domains of the concepts (Tsai & Roth, 2016) .

Thus, knowledge transcendence via knowledge homogeneity has become an important concern in the field of research and development. While the advancement of technology in the current regime provides new avenues to be explored in this context with a system development perspective. These systemic architectures could serve as backbone for developing KBs which are capable to the address the needs of current knowledge development.

Exploring some common grounds, it is observed that cognitive science has been looking at both these above-mentioned regimes of concern i.e. organizational and technological with a serious consideration. Most interestingly, the domain considers human knowledge development and knowledge processing capabilities as the true inspiration for dealing with all possible sides of knowledge related issues, whether organizational or technological. Thus, inclining the systemic development consideration towards inducing human like knowledge capabilities into machines and system analytics. In particular, research in the domain of artificial general intelligence has been significantly focused towards inducing human like abilities into agents i.e. machines, systems and architectures. This endeavor is being practiced to be operationalized using the inspiration from human memory models and learning protocols.

Realizing knowledge heterogeneity as a problem recognized across various organizational and technological perspectives, it is extremely significant to develop certain measures which could enable all these concerns to manipulate knowledge in the best possible manner and that too in an extensively deployable context. As mentioned earlier, AGI has been quite seriously involved in deducing technologically equipped solutions for rendering heterogenetic knowledge into classified and utilizable resource, it is therefore proposed in this paper that the knowledge management perspective of knowledge heterogeneity could be synchronized with the systemic approach from AGI to resolve the issue by achieving knowledge homogeneity. It is also proposed that the merger between the two domains would befit both the participating domains with a strategic approach towards knowledge transcendence i.e. achieving higher order knowledge generation/development.

2. Related Work and Need Assessment

2.1 Knowledge Mobilization

The ever-growing attention towards sustainable development has brought onset of sustenance science and its transdisciplinary deployment. The domain is an inclination for a diverse range of disciplines ranging from medicine and health, business development and even in climatic research. Science is believed to have a scope towards collective action thus being a transdisciplinary concern at large. Thus knowledge mobilization is a concern in the current regime, wherein, collaboration of both scientists and other societal players in needed, however, it has its own systematic barriers (Meehan, Klenk, & Mendez, 2017). Physical knowledge mobilization involves even more barriers in the context of mobilization, however, in the era of technological advancement as today, the perspective is very much deployable in context of system development, which is even being exercised in various modalities such as knowledge integration, knowledge bases etc.

2.2 Open Innovation

Innovation has been central to the researchers of the knowledge-based era. Business growth and development, technological advancement, sustainable development and all similar concerns have been accepted to be dependent on innovation. In due course, innovation has been studied and explored in a variety of contexts, stating it to be an activity which is resulted by social and collective activity ranging from individual level to that of group collectives such as organizations and economies etc. Herein, the network of innovation is established on the basis of collaboration between various actors of the innovation fabric, while the network is grown by the acquisition, absorptions, transference, application and evaluation of knowledge and information shared amongst the actors. Thus, knowledge makes up an integral aspect of the collaborative network and its innovation. (Guan & Liu, 2016).

One step ahead, the literature provides excerpts with a great deal of interest being driven by the researchers towards the notion of open innovation. Herein, open innovation has been defined as a purposely mediated environment for knowledge flow across organizational boundaries (Chesbrough & Bogers, “Explicating Open Innovation: Clarifying an Emerging", 2014). Open innovation has lately become an extremely promising and significant aspect for businesses and organizations operating across various sectors (West & Bogers, 2017). However, beyond all the advantages of open innovation, there are various limitations and challenges yet to be addressed, wherein, technology is a major concern (Chesbrough, 2017). As technological advancement is taking its pace over industrial, social and global development, so is the challenge of managing and designing the flow of knowledge streams being generated in the innovation networks.

Realizing the significance of open innovation and its need for knowledge flow amongst various actors, it is plausible to mention that there is a significant connection between open innovation and knowledge management. However, technology is an essential aspect to create a smooth and profitable alliance between the two streams. The last couple of years have witnessed an inclination towards new technologies such as Internet of Things (IoT), which demands the development of technologically advanced and equipped knowledge management systems to foster open innovation (Santoro, Vrontis, Thrassou, & Dezi, 2017). While looking at the literature, there still exists a gap in the exploration of the role of ICTs and systems to support the notion (Del Giudice & Della Peruta, 2016). In due course, it is critically important to move on from basic knowledge management systems (KMS) to digital ecosystems based on ICT infrastructures, intelligent architectures and platforms to foster innovation and growth across various facets of the global arena (Soto-Acosta & Cegarra-Navarro, 2016).

2.3 Knowledge Bridging, Transdisciplinarity and Sustainability

In order to enhance knowledge sharing across multidimensional areas of concern, it is extremely important to bridge both operational and scientific knowledge system, as it shall enable sustainability at various areas of human development (Tengö, et al., 2017). This notion of bridging knowledge system across potentially different premise (i.e. scientific, social and organizational) shall enable to encompass the diversity of knowledge at both conceptual and functional ends. This research regime believes in the need for a transdisciplinary connection and processing methodologies for crafting new knowledge which shall be both credible and deployable in a global context, thus providing new avenues for sustainable development (Clark, van Kerkhoff, Lebel, & Gallopin, 2016). This diversity of knowledge systems shall enhance the decision-making capacity of the concerned actors. This view of transdisciplinarity has been beautifully discussed as weaving – collaborations that respects the integrity of each knowledge system (Johnson, et al., 2016).

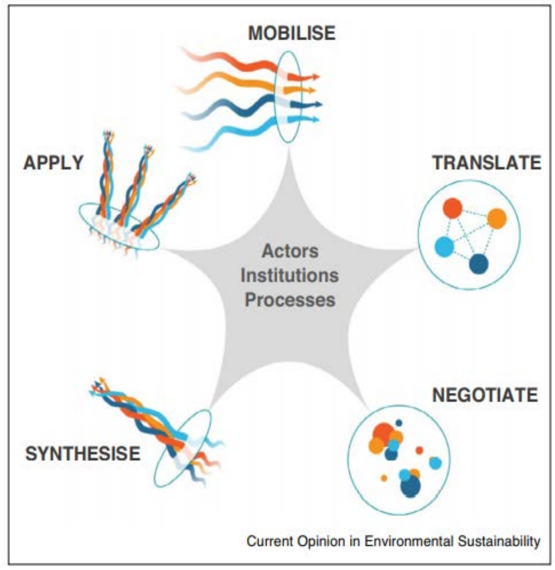


Fig. 1 Current Opinion in Environmental sustainability (Tengö, et al., 2017)

In Figure 1, the aspects given as the current opinions in environmental sustainability consists of mobilization, translation, negotiation, synthesis and application of knowledge for sustainability. Herein, mobility refers to the articulation of knowledge in a mutually sharable format, while translation refers to the comprehension of knowledge based on the collective views from various relevant actors. Negotiation here has been expressed as the notion of knowledge assessment in both convergent and divergent regimes and the exclusion of all possible conflicts. Synthesis here is the creation of a mutually agreed, body of knowledge maintaining the integrity of all possible knowledge participants, and lastly, application refers to the deployment of the synthesized knowledge across potential premise for decision making and also feed back to the originating knowledge system (Tengö, et al., 2017).

Sustainable development could only be materialized if it is achieved through transdisciplinarity, wherein, different facets of human concern are merged for decision making and problem solving. It is from transdisciplinarity that analytical and conceptual frameworks could be developed, a diversified approach towards based on creative, reflexive and transformative capacity for knowledge development. However, transdisciplinarity still suffers through the barriers of conceptual and structural premise (Lawrence, 2015).

Transdisciplinarity partakes both scientific and societal interface. The work of (Tejedor & Segalàs, 2015) explains it to be a transition of knowledge across various scientific and societal parameters, integration of this knowledge for collective learning. Herein, the authors have highlighted the significance of creating collaborative learning platforms, with a solution oriented approach for resolving the problems of the current regime and the ones coming ahead.

2.4 Transcendence

Transdisciplinarity is a notion to pursue knowledge transcendence. In due course, knowledge unity has been under consideration since the middle ages, while knowledge was segregated into various faculties yet all corresponding to the school of theology, thus giving rise to the need of synthesizing knowledge. Transcendence has been a perspective from various domains ranging from physics to biology, social to systems theory and philosophy at large, with an inclination to utilize the existing knowledge and to achieve higher order knowledge from the collective whole, by inducing co-production beyond academic, organizational or sectorial segments (Tejedor & Segalàs, 2015).

Thus, transcending knowledge is a significant challenge in the knowledge management domain, while for that transdisciplinarity appears to be an extremely plausible and promising pursuit. In due course, this paper has been aimed at exploring new avenues for knowledge transcendence, and transdisciplinarity while aligning the quest with that of technological development of the current regime.

3. Strategic Synchronization of AGI and KM

In the quest for providing plausible solutions for knowledge transcendence, technological inference has been explored to provide technologies and platforms which could support the aspects of knowledge co-creation in a transdisciplinarity context. Herein, the domain artificial intelligence holds prominent standing as it partakes the study of human intelligence and knowledge development, and also with its capacities of bridging and synthesizing large scale data, information and knowledge.

Artificial General Intelligence A(G)I has been at core of the technological advancement in general and the development of systems intelligence and analytics in particular. AGI has also been facing the complexities of managing knowledge, wherein, human like knowledge development and its manipulation has been one of the core pursuits of the domain. Therefore, in this paper, the strategic approach towards knowledge heterogeneity is based on the inspiration from the soft systems methodology, wherein, the systems perspective has been borrowed from the memory models and knowledge mapping techniques used in AGI. Furthermore, KM and AGI have been working in pursuit of knowledge development and sharing across various platforms, therefore, synchronizing the approaches from both these domains shall befit in the development of sustainable, autonomous and homogenetic knowledge repositories.

An extremely promising aspect which inspires the consideration of merging both AGI and KM is the multidisciplinary premise of both domains i.e. AI ranges from expert systems, neural networks, virtual and augmented reality to natural language processing etc., while KM ranges from human behavior and psychology, cognitive science and the core epistemology even. Herein, KM intends to enable knowledge sharing, exploitation and usage, all through the organizational hierarchies, at both, individual and organizational levels. This is to achieve innovation and value creation by knowledge coproduction. So is the case with AI, which has been focused at developing human like characteristics of intelligence in machines. Knowledge therefore seems like the common ground being worked upon in both these domains. At one hand where KM provides the modalities of learning and the patterns of knowledge development in the humans, AI enables the operationalization of learning mechanisms in machines using technical protocols such as neural networks, deep learning, pattern recognition etc. (Rhem, 2017).

4. Proposed Model

Studying the challenges pertaining to knowledge management and sharing in a transdisciplinary context, this study has proposed a model based on the combination of knowledge management and artificial intelligence, using a dual approach i.e. architectural and component based. The model is given as under;

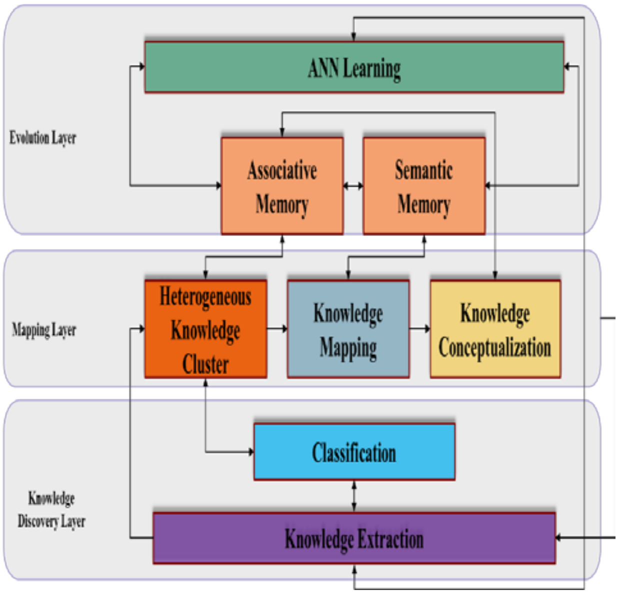


Fig. 2 Proposed Model: Knowledge Transcendence (KnoTran) Model

The model has been developed using an organic approach i.e. human like knowledge development process has been developed, while the learning component of the model is the core inspiration. AGI provides multifaceted mechanisms and modalities to induce learning in the agency. Thus, system development for KM could significantly befit from the technological proficiencies of AGI and create closest of naturalistic systems for the cause.
Heterogeneous knowledge cluster refers to the repository of diverse knowledge spread across various knowledge domains (organizational functional units, scientific domains, knowledge repositories etc.). In the pursuit of both, developing and acquiring transdisciplinary knowledge, the heterogenetic knowledge needs to be synched together based on both conceptual and functional properties and deployability of the knowledge content.
However, heterogeneity assessment is neither possible nor feasible until or unless it is treated for refinement every time new knowledge is created, shared, updated etc. and in due course, the learning mechanism has been incorporated as a major inspiration from the practices of AGI. Learning here is operationalized in two modalities, wherein, association refers to the bonding of heterogenetic knowledge existing across various clusters, and semantic refers to the creation of meaning and understanding to the knowledge. The learning protocol is considered to be ever evolving and thus refining the body of knowledge.
Once knowledge in the heterogenetic clusters is primarily assessed via learning protocol, it is then linked to the next aspect of the model i.e. mapping. Herein, mapping provides the basis for transdisciplinarity by linking across domain heterogenetic knowledge by establishing contextual relations. Once map for transdisciplinary knowledge is acquired, it is forwarded to the conceptualization aspect which actually plays the vital role in creating a coherent knowledge structure. An important aspect to be mentioned here is that the model has been developed with a consideration to keep the originating domains of knowledge intact. It is for the fact that functional deployability of knowledge is a specific and contextual element, which could not be homogenized, while the concepts which overlap the same regime of concern should be brought together for transdisciplinary knowledge development. In due course, the extraction aspect proceeds conceptualization, extracting both conceptually coherent and functionally intact knowledge schemas. Wherein, this research refers this homogeneity schema as a power muscle in the transdisciplinary knowledge development. However, extracted knowledge schema needs to be linked back to all participatory heterogenetic aspects, for which, the classification protocol has been incorporated. While the loop completes, it adds on this newly developed knowledge discovery into the existing repository, thus enabling the transcendence of knowledge at large, that too in a transdisciplinary context.
Thus, the proposed model shall enable carrying out autonomous homogenization of heterogenetic knowledge, primarily by mapping for conceptual and functional associations and relations, and later provide conceptualization based on the output provided by the two preceding aspects. It is therefore plausible to state that the proposed model shall establish grounds for knowledge transdisciplinarity by enabling the relationships between various domains, providing better proficiencies towards decision making and problem solving at different domestic and commercial ends, thus achieving knowledge transcendence.

5. Methodology

Knowledge has been studied and observed to be extremely diverse yet dynamic, thus, ever evolving. With diversity it relates to the conceptual and functional regimes, its multidimensionality and duality, wherein, at one instance it is subjective and the other it becomes objective. At one point in time it is vested with an individual or system, the other it is a part of collective knowledge base or world view. Thus, managing this dynamism is not only challenging but equally critical. In due course, this paper has suggested a linkage between knowledge management and artificial intelligence. It is however important to justify the proposed model and its workability for the given challenges. Exploring the methodologies, this paper has utilized fuzzy logic as a plausible technique to validate the proposed model, as fuzzy logic allows studying diverse range of possibilities, thus being capable of handling dynamic properties of the phenomenon under observation. Moreover, a core reason of selecting fuzzy logic was its closure to the naturalistic approach i.e. real life does not work on mere yes and no, rather, there are possibilities of variations in behavior in decision making. Thus, fuzzy logic is considered to be one of the many forms of valued logic, that too close to natural decision making process, unlike traditional mathematical logic (Bezděk, 2014).

In the naturalistic approach, the decision making process varies between values of vagueness, ambiguity, possibility, probability, uncertainty etc. which is unlike the crisp mathematical logic, and incorporates a wide range of decisions. Fuzzy reasoning exists in a diverse range of natural phenomenon, ranging from social, cultural, political, economic and business related etc. Thus, fuzzy logic is a plausible approach to study varying phenomenon as it allows the assessment of values other than absolute. (Şen, 2017). Therefore, in order to validate the proposed model and its workability, this research has used fuzzy logic based system to assess the performance of the proposed model in different performance conditions. The scheme of fuzzy based investigation which has been adopted in this research is provided as under;

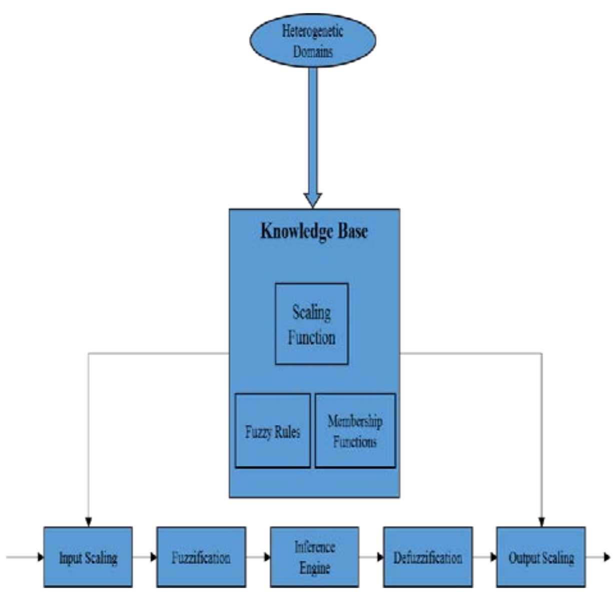


Fig. 3 FISKT: Fuzzy Inference System for Knowledge Transcendence

i. **Inference Engine:** fuzzy inference engine provides the operatives for the fuzzy logic and the relevant defuzzifier used in this process.

ii. **Membership Functions:** membership functions here are responsible to outline the intensity of parameters and its relation to the fuzzy set.

iii. **Defuzzification:** the defuzzifier here provides quantifiable results for the selected fuzzy set in a crisper yet relatable manner.

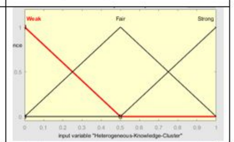
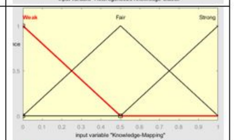
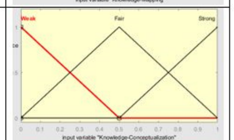
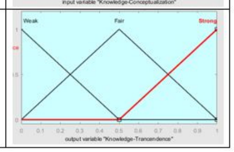
The performance has been characterized into three states/ranges i.e. W: Weak, F: Fair and S: Strong. Three of the variables from the model have been kept in the assessment process i.e. heterogenetic knowledge cluster, knowledge mapping and knowledge conceptualization. Thus, acquiring a total of 27 possibilities of performance stated as Rules, detailed as under;

Table 1: Proposed FISKT Lookup Table

Fuzzy Rules for Model Validation				
Rules	Hetero geneous Know ledge Cluster	Know Ledge Mapping	Know ledge Concept ualization	Know ledge Trans cendence
1	W	W	W	W
2	W	W	F	W
3	W	W	S	W
4	W	F	W	W
5	W	F	F	W
6	W	F	S	F
7	W	S	W	W
8	W	S	F	F
9	W	S	S	F
10	F	W	W	W
11	F	W	F	F
12	F	W	S	F
13	F	F	W	F
14	F	F	F	F
15	F	F	S	F
16	F	S	W	F
17	F	S	F	F
18	F	S	S	S
19	S	W	W	W
20	S	W	F	F
21	S	W	S	F
22	S	F	W	F
23	S	F	F	F
24	S	F	S	S
25	S	S	W	F
26	S	S	F	S
27	S	S	S	S
W=Weak, F=Fair, S=Strong				

Furthermore, the rules have been assessed for the performance results wherein, three input variables i.e. Heterogeneous Knowledge Cluster (HKC), Knowledge Mapping (KM) and Knowledge Conceptualization (KC) have been studied to cumulatively participate in Knowledge Transcendence (KT). Herein, the extent of knowledge transcendence is dependent on the quality of inputs, while both inputs and outputs are assessed on the basis of three categories i.e. Weak, Fair or Strong.

Table 2: Proposed FISKT I/O Membership Functions

Sr No.	Input Variables	Membership Function(MF)	Graphical Representation of MF
1	Heterogeneous-Knowledge-Cluster=HKC $\mu_{HKC}(h)$	$\mu_{HKC,Weak}(h) = \left\{\frac{h}{0.5}, \quad 0 \le h \le 0.5\right\}$ $\mu_{HKC,Fair}(h) = \left\{\begin{matrix} \frac{h}{0.5}, & 0 \le h \le 0.5 \\ \frac{0.5-h}{0.5}, & 0.5 \le h \le 1 \end{matrix}\right\}$ $\mu_{HKC,Strong}(h) = \left\{\frac{h-0.5}{0.5}, \quad 0.5 \le h \le 1\right\}$	
2	Knowledge-Mapping=KM $\mu_{KM}(k)$	$\mu_{KM,Weak}(k) = \left\{\frac{k}{0.5}, \quad 0 \le k \le 0.5\right\}$ $\mu_{KM,Fair}(k) = \left\{\begin{matrix} \frac{k}{0.5}, & 0 \le k \le 0.5 \\ \frac{0.5-k}{0.5}, & 0.5 \le k \le 1 \end{matrix}\right\}$ $\mu_{KM,Strong}(k) = \left\{\frac{k-0.5}{0.5}, \quad 0.5 \le k \le 1\right\}$	
3	Knowledge-Conceptualization =KC $\mu_{KC}(c)$	$\mu_{KC,Weak}(c) = \left\{\frac{c}{0.5}, \quad 0 \le c \le 0.5\right\}$ $\mu_{KC,Fair}(c) = \left\{\begin{matrix} \frac{c}{0.5}, & 0 \le c \le 0.5 \\ \frac{0.5-c}{0.5}, & 0.5 \le c \le 1 \end{matrix}\right\}$ $\mu_{KC,Strong}(c) = \left\{\frac{c-0.5}{0.5}, \quad 0.5 \le c \le 1\right\}$	
4	Knowledge-Transcendence = KT $\mu_{KT}(t)$	$\mu_{KT,Weak}(t) = \left\{\frac{t}{0.5}, \quad 0 \le t \le 0.5\right\}$ $\mu_{KT,Fair}(t) = \left\{\begin{matrix} \frac{t}{0.5}, & 0 \le t \le 0.5 \\ \frac{0.5-t}{0.5}, & 0.5 \le h \le 1 \end{matrix}\right\}$ $\mu_{HKC,Strong}(t) = \left\{\frac{t-0.5}{0.5}, \quad 0.5 \le t \le 1\right\}$	

Test Cases: -

Three test cases have been studied for the assessment of quality of output based on different values of input. The cases are explained as under;

Test Case 1:-

Rules	Heterogeneous Knowledge Cluster	Knowledge Mapping	Knowledge Conceptualization	Knowledge Transcendence
4	**W**	**F**	**W**	**W**

Test Case 1 has been developed with the inputs from three selected aspects HKC, KM and KC as W, F and W respectively, while with these inputs, KT is observed to be Weak.

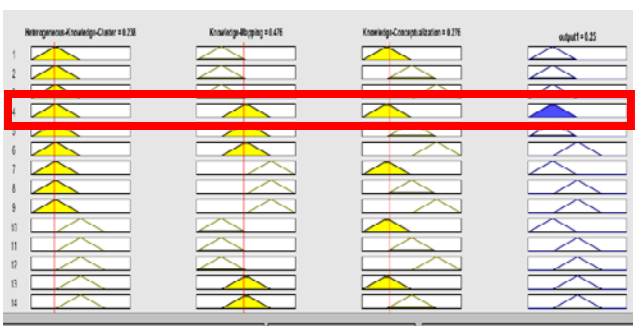


Fig. 4 Case 1

Figure4 shows that if the Heterogeneous Knowledge Cluster is 0.238(weak), Knowledge mapping is 0.47(Fair) and knowledge conceptualization is 0.27(weak) then the Knowledge Transcendence is 0.25 which is weak.

Test Case 2: -

Rules	Heterogeneous Knowledge Cluster	Knowledge Mapping	Knowledge Conceptualization	Knowledge Transcendence
8	**W**	**S**	**F**	**F**

Test Case 2 studies the values of HKC, KM and KC as Weak, Strong and Fair respectively, while with these inputs, KT is observed to be Fair.

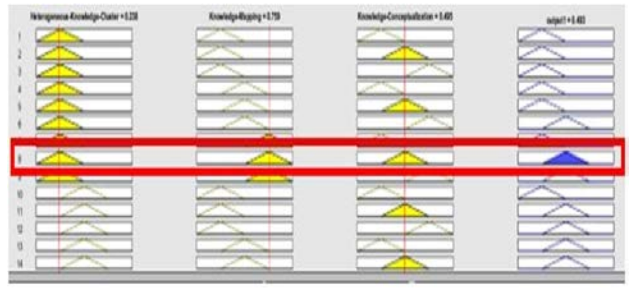


Fig. 5 Case 2

Figure 5 shows that if the Heterogeneous Knowledge Cluster is 0.238, Knowledge mapping is 0.7 and knowledge conceptualization is 0.49 then the Knowledge Transcendence is 0.49 which is fair.

Test Case 3:-

Rules	Heterogeneous Knowledge Cluster	Knowledge Mapping	Knowledge Conceptualization	Knowledge Transcendence
18	**F**	**S**	**S**	**S**

Test Case 3 studies the values of HKC, KM and KC as Fair, Strong and Strong respectively, while with these inputs, KT is observed to be Strong.

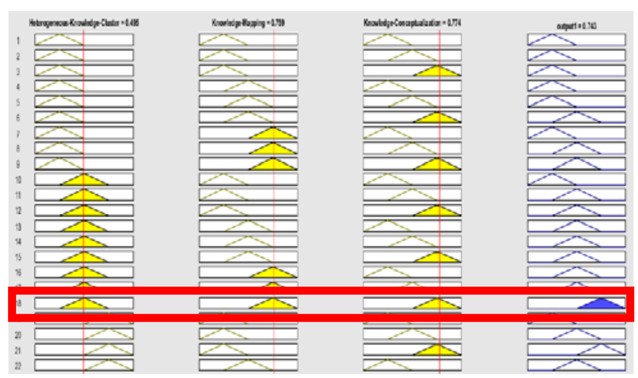


Fig. 6 Case3

Figure 6 shows that if the Heterogeneous Knowledge Cluster is 0.49 (Fair), Knowledge Mapping is 0.75(Strong) and Knowledge Conceptualization is 0.77(Strong) then the Knowledge Transcendence is 0.74 which is Strong.

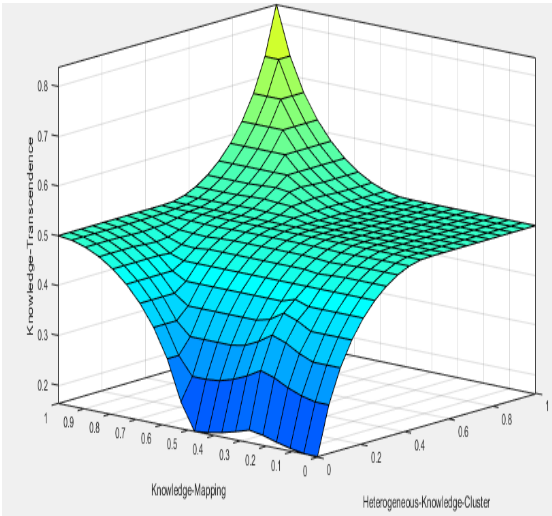


Fig. 7 Rule Surface for Knowledge mapping and Heterogeneous Knowledge Cluster

Figure 7 represents the overall performance of the proposed model using the two input variables Knowledge mapping and Heterogeneous Knowledge Cluster. If the Probability value of Knowledge mapping up to 0.45 (weak/fair) and Heterogeneous Knowledge Cluster is 0.1 (weak) then the Knowledge Transcendence is not taking place (weak). By gradually increasing Heterogeneous Knowledge Cluster up to .50 (fair) and Knowledge mapping to .45 (fair) the Knowledge transcendence is also increasing up to .50 (weak/fair). After increasing both i/p variables probability from .50(fair) to 1(strong) the probability of Knowledge transcendence is gradually increasing from .50(fair) to .90(strong).

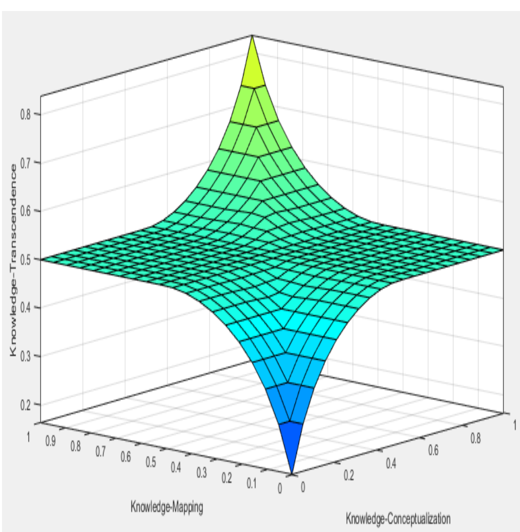


Fig. 8 Rule Surface for Knowledge mapping and Knowledge Conceptualization

Figure 8 represents the overall performance of the proposed model using the two input variables Knowledge mapping and Knowledge Conceptualization. If the Probability value of Knowledge mapping is weak and Knowledge Conceptualization is also weak then the Knowledge Transcendence is weak. In case knowledge mapping is strong, while knowledge conceptualization lies between weak to fair, knowledge transcendence in that instance would also be fair, and vice versa. By gradually increasing Knowledge Conceptualization to fair and Knowledge mapping to fair, the Knowledge transcendence would also be fair. After increasing both i/p variables probability to strong the probability of Knowledge transcendence gradually increases to strong.

6. Conclusion

Knowledge heterogeneity could be foreseen as a growing challenge in the current and the upcoming regimes. Wherein, technological advancement in general and the intelligent platforms and protocols being developed by artificial intelligence in particular could be a plausible solution to overcome the challenge. In due course, the proposed model has been developed and evaluated for knowledge transcendence, with some promising results for future consideration and operationalization.

The proposed model of this study has been established with an intension to provide a platform for knowledge transcendence, which has been validated using fuzzy logic inference system. The results support the notion of incremental yet interdependent knowledge development from a heterogenetic perspective, wherein, mapping and conceptualization of transdisciplinary knowledge has been studied as the drivers of knowledge transcendence. As observed in the results, establishing associations and relations of knowledge from the heterogenetic perspective could only yield prospects if this knowledge is appropriately mapped for the given context. Furthermore, it is mapping which provides conceptualization of knowledge of transdisplinary origin. Once each one of these variables are established, knowledge transcendence takes place. It is however notable that the results show a diverse range of output w.r.t knowledge transcendence, depending on the quality of input being provided by the three variables i.e. HKC, KM and KC. Herein, the significance of mapping is observed by the fact that even if HKC is weak, yet strong mapping has been achieved, it shall lead to fair/strong conceptualization and subsequently transcendence. It is also notable that the results show a naturalistic pattern of knowledge transcendence, where there is a room for refinement and improvement at all levels.

Thus, using artificial intelligence in knowledge modelling and managing heterogenetic knowledge is a plausible solution for both, transdisciplinary knowledge development and knowledge development at large.

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