

**A Study of Actors' Knowledge Network in Creative Industry:  
The Formation Process and Structural/Spatial/Temporal Characteristics of Innovation Cluster  
in the Case of Digital Contents**

(創造産業における主体間の知識ネットワークに関する研究：デジタルコンテンツ産業における構造的・空間的・時間的な形成過程と特性)

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The research focused on the in the era of creative economy and the knowledge network society. From the dynamics of industry development perspective, the Korea experience industrial restructuring with regard to industrial policy and technology development. The two restructuring processes in the 1990s, which were related with the labor movement in the late 1980s and to the financial crisis in 1997, had considerable impact on the dynamics of movement in Korea. The development of ICT, has significantly contributed to spatial dynamics, along with the facility of networks and transferability of services in the knowledge-based economy.

Under these backgrounds, this research evaluates the actors who establish knowledge network based on digital contents of creative industries are presented in the form of formal and informal network effectiveness. The main formal serve to indicate that actors' knowledge network explain to structural, spatial and temporal aspects using data of joint research. In terms of informal network, the role of personal performance in the formation process of knowledge network investigated from the personal performance of community and forum network in terms of structural, spatial and temporal aspects. The objective of this research aims to identify the significance of formal and informal network in the aspect of personal performance and organizational networks. It is for the establishment of knowledge network in creative industries by empirical study in the case of Daedeok innopolis(DDI), Daejeon, and Digital Media City(DMC), Seoul which selected as a result of knowledge network in Korea.

As emergence of knowledge-based society, it is arguable that creative industries play a key role in economic development in the region as innovation and creation. This research suggests that the role of government policy and strategy affects the formation process of knowledge networks. For that reason, this research argues that the formal and informal network plays a key role to establish knowledge network in creative economy. This article provides a social network analysis data-driven, empirical analysis of the knowledge network role in the aspect of social network analysis. To identify the significance of roles of actors' performance, the social network analysis for digital content industry in creative economy conducted in the case of representative regional and time frame contexts.

Three research themes were put forward. First of all, the research is that the structural characteristics of formal

and informal network in terms of actors' role and characteristic. Furthermore, spatial characteristics of geographical proximity are important to establish the knowledge formation in knowledge network through transmission of tacit knowledge. The temporal characteristics of knowledge network evolves and differentiates process producing creative milieu. That is for, the characteristics of actors' performance in formal and informal network in creative economy and the formation process of network based on organizational and individual performance.

The process of research is that phase one was a preparation stage. First, this research reviewed the knowledge network and creative industries related policy and strategy to confirm that there were notable research requirements. Then, collected data and analysis on overall knowledge network all related with digital contents in Korea for knowledge network data analysis from 2000 to 2010. The joint research data of digital content industry gathered from Ministry of knowledge economy in Korea. In this stage, select 2 cases to analysis formal and informal network with detailed watching. This research uses Netminer 3.0 version which tool for social network analysis. Phase two was a data collection and analysis stage to identify informal network in digital contents. This research evaluates the informal to divided in communality and sociality activities in case of representative regional frame contexts Daedeok innopolis (DDI), Daejeon and Digital Media City(DMC) in Korea. Data gathered through in-depth interview and website information about community and forum activities. Phase three was for analysis. Based on the findings in Phase 1 and 2, I examined whether in the two regions had similar and different trends of formal and informal network. This research conducted questionnaire surveys, to support insufficient idea from network analysis, along with 2key informants and regulatory agency in each region. In-depth interview included in worker who belongs in good innovation cluster performer, venture industries, medium-sized industries, research centers, and government officers. These were included because the questions of effectiveness of network were sensitive issue in both areas to government; it seemed that they would be less reluctant to reveal true reasons for 'ineffectiveness of network.'

First of all, unlike scholarly works in knowledge network theory and analysis of theory, this research aims that the structural characteristic of formal network view rule of innovation cluster with the actor's performance on the formation process. As seen result of analysis, the two cases can be explained by innovation cluster factors. The observed differences in knowledge network in innovation cluster compliance in the two different regions. DDI establish 'self-organization' in the regional area which out-direction network is more activated than in-direction based on technology-oriented development. However, DMC makes their own cluster affected by capital region which concentrated on market opportunities based on digital contents production and distribution. The best explained through close examination of patterns of actors' network in DDI possess strong based in informal of communality and sociality network. Moreover, the participants of informal network who belong in universities, medium-large sized industry actively join informal network. It motivates them increase effectiveness of the tacit knowledge transmission. These formal and informal factors affect the way of network development by cluster establishment supported idea from questionnaires survey. This implies that the success in DDI should not be attributed to chance, but rather viewed as containing lessons applicable across other regional innovation cluster.

Seconds, in the spatial distribution in the network, the innovation cluster view knowledge network as a strategy through geographical distribution in Korea. As this research shown, however, network embeddedness does not follow such a course only for formal network. The observed differences in innovation cluster in the two cases cannot be explained by economic and social factors but government policies. They are best explained through close examination of patterns of institutional performances of informal network by actors based on network embeddedness. These multifaceted perspectives affect the ways of knowledge network roles, in turn, expand the strategic of development. In DMC, government support intensively to make power node which acts role as expand its effectiveness to others. These Strong-ties require establishing in the initial stage of innovation cluster formation in DMC. On the other hands, DDI which already experience industrial restructuring process, it established weak-ties broadly. The rational approach thus retains significant implications for the principles underlying formal regulations that target actors' which have powerful interrogator.

Third, in terms of temporal characteristics, stage 1 is 'technology trigger' which explicit evidence that economic crisis and ICT development encourage industrial restructure in Korea in the late of 2000. In this period, national government changes the policy from industrial cluster to innovation cluster. Digital contents technology trigger by strong innovation cluster policy. In the initial stage of formation of knowledge network 'tacit knowledge transmission' is significant by face-to face meeting. Stage2 it explained by "Peak of Inflated Expectations". In this period DDI and DMC focused on one-sided development such as technology-oriented in DDI and digital contents production and distribution in DMC. The number of industries related with digital contents rapidly growth. The network characteristic is fewer nodes but many links establishment. From this stage voluntarily participants of informal network increased. It effected by WOM(Word-of-Mouth effect) to advertisement .On the stage of inflated expectations, the network grow up by 'feedback' tendency. In stage3, it shows "Trough of Disillusionment"-In this stage, tacit knowledge is important to transmission of information. Moreover, explicit knowledge is also significant affected by tacit knowledge transmission. This trends show 'rich get richer, poor get poorer' on the network. When it moves on stage4, "Slope of Enlightenment" - In this stage tacit knowledge transmission is significant role to produce knowledge outputs. Moreover, it increased formal network effectiveness by informal network. Voluntarily emergence of informal network, forum and community activities increased. Based on formal and informal network activation, 'self-organization' is established on the step to enlightenment. In the stage5, "Plateau of Productivity" -Based on the stable formal and informal network, creative milieu creates environments to create innovative idea and cluster. It is ideal environment for innovation cluster. From the questionnaires survey, many people answer that not only network effectiveness but also environment is important factors to establish creative milieu such as park, café, and good restaurants.

Though useful, this finding alone did not provide satisfactory answers to the primary research questions. It naturally pushed the inquiry further: Given the almost identical innovation cluster policy, how it affects on different way in different place? How it works and how much people satisfied with innovation cluster? To answer insufficient idea this research conducts the questionnaires survey in DDI and DMC.

The formal network in DDI and DMC show that the satisfaction and advantage to increase work efficiency. In case of total group, they are satisfied network with government and research center in DDI. However, in DMC shows comparatively low satisfaction in network with them. In DDI, the group of university answers that network between different industry, government and research center are helps to work efficiency and satisfied with network and cluster. It helped by government network and cluster upbringing policy in DDI since 1970s. On the other hands, venture industry indicates not satisfied with network with research center and university in DMC. Moreover, medium-sized industry also answers that they are not satisfied network with university. It requires strengthening the network between industry and university in DMC. In DDI, medium-sized industry answers the high satisfaction in networking with research center.

In the aspect of informal network, this research compared DDI and DMC in the aspect of communality networks. Total group of people answer that the communality network in DDI and DMC are not satisfied with. Moreover, medium-sized industry in DMC quite satisfied with communality network especially university alumni and blood ties help to work. In case of venture industries, blood ties and university alumni effects on the work efficiency in DMC. The group of university affects the human relationship in DDI than DMC. In DDI, the regional university such as KAIST, Hanbat University and Chunbuk national university shows the high centrality in the power node. Not only spatial limitation but also structural benefits, the university based network is enforced in DDI. On the other hands, many university-industry research center located in DMC. Even though university based research center are important role in network and cluster not only DMC but also Seoul area, these universities establish weak network among them yet. Moreover, the workers who graduate from regional universities are found work opportunities in Seoul area. It causes that the university-based communality network is weak in DMC. The group of government, blood ties and same birth place network are well established in DMC. This tendency shows that government worker establish communality network with common sense. The purpose of network is not to get advantage form others but emotional exchange by face-to-face meeting in work places.

In the knowledge network effectiveness, the total group of people in DMC satisfied with the infrastructure and environment compared with other factors. Especially, venture industry and government groups satisfied with infrastructure in DMC. Moreover, university group answer the high satisfaction in environment. In case of DDI, the total group of people answer environment and infrastructure is important for network. Especially, university and government group satisfied compared with DMC. however, the majority people in DDI answer the public transportation is required to re-establish with more convenience. The things is that social equity in DMC and DDI are not yet established well. The majority of people answer that infrastructure and environment are important to make creative milieu.

This research addressed issues require careful study to advance more effective innovation cluster policy with new emerging sector of industry. Nevertheless, they do not detract from the unique conditions of the relational approach in explaining formal and informal network. This approach offers a new understanding of actors' role and characteristics in knowledge network of creative industries as creativity objects. this research findings should be carefully considered when designing future innovation cluster with new emerging industries.