Derivation of Future Promising Industries from the Standpoint of Demand and their Marketization and Industrialization

Gwang-hun Choe, Yun-hui Choe, U-jung Sim, Seung-min Kim

1. Introduction

Various external, cyclical, and demographic factors have been implicated in the low growth recently affecting the South Korean economy, but one of the chief factors is the industrial issues of the current growth model and its limitations. As a developing economy, the country achieved success through a “fast follower” rather than a “first mover” strategy, and through an input-driven model of growth. Such growth, however, has been eroded by stagnation in high-tech areas due to a lack of benchmarks, as well as the challenges posed by late starters.

Accordingly, continued growth in the South Korean economy necessitates the adoption of a different growth model, a proactive effort to uncover promising future industries, and the development of pioneering industrialization.

At the same time, rapid industrial changes have also occurred, reflecting swift changes in social and economic conditions toward a future society. In policy terms, there is a growing demand for a fast discovery of and response to promise future technologies and industries.

Most studies aimed at predicting this future and uncovering its most promising industries, however, have focused on suppliers and technological development, while their connection to industries that are actually being newly marketized has been lacking. The absence of a demand perspective in economic, commercial, or humanities terms has led to prediction errors, which ultimately result in erroneous industrial policy and increase the risk of societal losses.

With this in mind, this study is concerned with developing a research methodology for predicting and identifying promising future industries from a demand perspective as well as inferring their policy adjustments to encourage demand for such future industries.

2. Identifying Promising Future Industries from a Demand Standpoint

(1) General Methodological System and Analysis Target Candidate Selection

The methodological system for future prediction from a demand standpoint consists of four total stages, each with its own sub-stages. Prior to the main analysis, the first stage involves a process of analysis target candidate selection, or choosing a pool of promising future industry candidates for the subsequent analysis.

Figure 1. Methodological System for a Demand Approach to Identifying Promising Future Industries

Stage 1: Selecting pool of candidate products for promising future industries

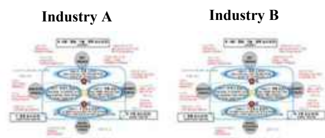
Brainstorming, literature review ⇒ Industry A, Industry B, Industry C

Stage 2: Static Analysis: Expanded industry ecosystem for candidate industries

(1) Major players

(2) Ecosystem determinants

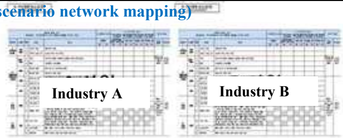
(3) Current conditions and analysis



Stage 3: Dynamic Analysis: Ecosystem scenario (scenario network mapping)

(1) SNM Step 1: F.G.I.

- Influence (Ripple effect)
- Likelihood of occurrence / Current level



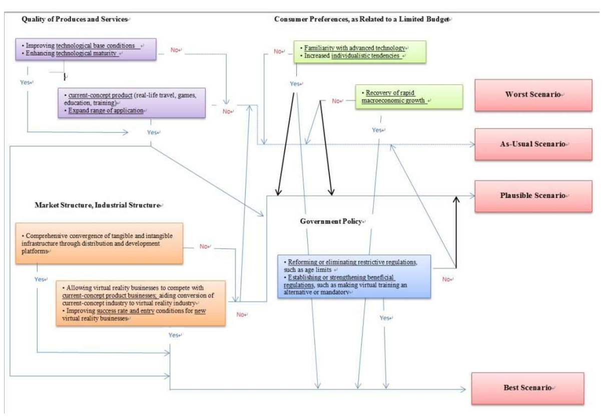
(2) SNM Step 2: Analysis of influence and sensitivity of demand encouragement determinants

(3) SNM Step 3: Analysis of future promise rankings and current standings

- Demand encouragement level: Industry B > Industry A > . . . > Industry G > . .
- Scenario differences: Best-Case <> Plausible <> As-Usual <> Worst-Case

(4) SNM Step 4: Backcasting and Morphological Pathways

- Backcasting: Best -Case < Plausible
- Scenario network mapping for different industries



Stage 4: Identifying Policy Implications and Tasks

⇒ Analyzing causes, policy implications, marketization/industrialization tasks

Source : KIET.

Studies to predict the future may be categorized into those that offer different "types" for the future through the form of their results and those that specify promising technologies or products, as with a "Ten Best Technologies" list. Even in the latter case, promising technologies may be inferred directly from technological evolution or the necessity of social change, and numerous targets may be condensed into a smaller candidate pool by set standards and subjected to analysis, whereby promising industries may be deduced according to their ranking.

For this study, the second methodology was adopted, as it permits a uniform comparison of targets and various forms of analysis. Under this approach, analysis target candidates are typically chosen through brainstorming and a review of the relevant literature.

(2) The Future Industry Product/Service Ecosystem and Demand Determinants

For selected future industry candidates to be compared and ranked in order of promise for causal analysis, a shared analytical framework must exist. In Stage 2 (Static analysis: expanded industry ecosystem by future industry sector), each candidate industry is considered within the single platform of an industry ecosystem analytical framework from a demand and expansion perspective.

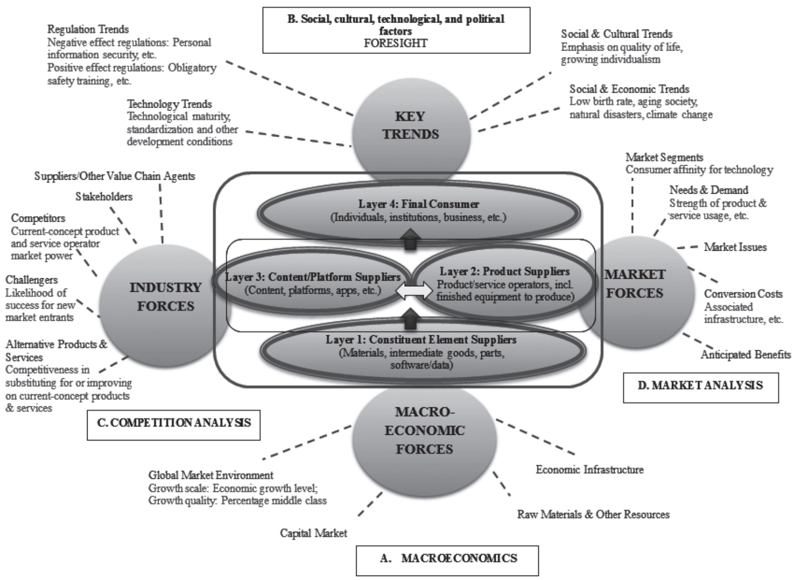
An industry ecosystem is a useful tool for systematically determining the stakeholders and environmental elements within an industry. In this case, however, it must also be reconfigured to refer to the characteristics of "future industry demand," as it has to suit the purpose of identifying promising industries under a demand approach, i.e., determining different future industry products and services from a demand encouragement standpoint.

As a first step, the industry ecosystem in Fransman (2007) was used, as it clearly presents the relationships of financial, informational, and material flows between supply and demand agents (segments) to enable the latter form of demand relationship analysis. In terms of the former aspect, or that of future industry products and services, its distinction from current concepts lies in the fact that devices are not merely demanded but also consumed in combined form with content. The difference between a smartphone and a mobile phone is that the former provides information services through its various apps rather than being used for telephone communication alone.

As shown in Figure 2, the ecosystem contains two relationships, those of final good demand (product + content supplier → final consumer) and intermediate good demand (constituent element supplier → product + content supplier). The marketization of future industries can only be facilitated when these two relationships reinforce each other.

At the same time, businesses are continuing to research various future predictions and strategies in their efforts to develop markets. One of these approaches, the Business Model Canvas environment analysis of Osterwalder and Pigneur (2010), systematically presents the factors determining success or failure when companies plan or develop future products and begin marketing. While these represent the external environment from the perspective of an individual company, they are factors driving the industry and determining demand from a comprehensive industry or ecosystem standpoint.

Figure 2. Demand-Centered Future Industry Ecosystem and Demand Determinants



Source : KIET, adapted from Fransman (2007) and Osterwalder and Pigneur (2010).
Note : Red arrows indicate demand direction; red text represents demand determinants actually used in analysis.

As Figure 2 shows, these can be specified into 16 demand determinants for the purposes of analysis.

(3) Extent of Demand Encouragement and Various Scenarios

If Stage 2 focused on the general ecosystem for candidate industries and offered a "bird's-eye" perspective on the specific agents, Stage 3 (Dynamic analysis: industry ecosystem scenarios) leads into the main future study, consisting of a dynamic analysis of individual industry ecosystems changing under the influence of ecosystem demand determinants as well as a quantitative comparative analysis of differences between the different forms of industry. In methodological terms, it involves a scenario network mapping (SNM) analysis with four sub-steps.

In SNM Step 1 (Industry ecosystem determinants and focus group interviews), the determinants for demand encouragement in the industry ecosystem from Step 2 are quantified by way of focus group interviews. The influence (ripple effect) of determinants by industry and demand relationship and their likelihood of occurrence (future expectation level) and current level are investigated. In SNM Step 2 (Impact analysis of industry ecosystem demand determinants), questionnaire data are used to analyze the influence of demand determinants by industry and category.

This is followed by SNM Step 3 (Plausible Scenario and ranking of future promise), in which the likelihood of occurrence for determinants in different future industries (or their anticipated level) is analyzed, with general scores assigned in terms of influence and likelihood to calculate the extent of demand encouragement (demand encouragement index). The contribution of an individual factor to encouragement of demand in future industry "A" can be accounted for in terms of that actor's level and its impact on demand. By adding all of these components, the general demand encouragement in Industry A (or its demand encouragement index) can be estimated in quantitative terms.[1)]

---

1) Similarly, this can be explained by *xi*'s influence on *y* ($\frac{\partial f}{\partial x_i}$) and level (*xi*) in the *x* function *y=f(x)*, as in the form $y = \frac{\partial f}{\partial x_1}x_1 + \frac{\partial f}{\partial x_2}x_2 + \dots + \frac{\partial f}{\partial x_I}x_I$

Total demand encouragement for future industry A = $\sum_{i=1}^{16}$Market determinant influence$_{iA}$ × Level of corresponding factor$_{iA}$

Demand determinants were first introduced as part of companies' future market strategies. From a future perspective, future paths (scenarios) are formed from changes to these levels (or their likelihood of occurrence), referring to the extent of demand encouragement for each scenario.

Thus, the Business-As-Usual (BAU) Scenario (i) refers to the status quo continuing without change when viewed from its present level, while the Plausible Scenario (ii) refers to the most probable of potential futures when predicted in terms of a ten-year time horizon. The Best-Case Scenario (iii) represents the ideal when the highest value is introduced, while the Worst-Case Scenario (iv) represents a situation in which the lowest score is assigned to reflect the most negative traits.

From this, promising future industries can be identified by assigning rankings to analysis target candidate industries according to two forms of promise from the Plausible Scenario, so long as they adhere to a ten-year time horizon: (a) total absolute level of demand encouragement, which can refer to market scale, and (b) the difference between the general demand encouragement level and the Best-Case Scenario, or the extent to which an optimal state is approximated. In addition to the analysis of a total figure, SMS Step 4 (Backcasting and morphological paths) involves the decomposition of each future industry into its individual demand determinants (categories) for a backcasting analysis to determine the factors that obstructed the Best-Case Scenario. This diagnosis of underperformance factors through the difference between individual demand encouragement and the optimal state can be used to identify policy implications in terms of achieving an ideal level.

Additionally, diagrams of the morphological pathways for the four scenarios can be used to provide a general picture of the present and future while identifying problem areas for specific industries.

In Step 4 (Policy implications), the results of the analyses in the aforementioned stages are used to identify policy implications for demand encouragement and marketization or industrialization. At this stage, implications and tasks in terms of deficiencies from the current level, areas in need of supplementation, and responses to future elements are presented.

3. Demand-Side Approach to Marketization and Industrialization Analysis for Promising Future Industries

(1) Influence and Likelihood of Future Industry Ecosystem Demand Determinants

The above methodology can be applied to all imaginable future products, services, and technologies without restrictions on area characteristics or number. For the purposes of experimental application of the methodology and re-evaluation of current policy industries, analyses were performed for four of South Korea's nineteen "future growth engines," namely virtual reality, customized wellness care, intelligent robots, and smart cars.

Table 1. Influence of Determinants on Industry Ecosystem Demand and Their Likelihood

	Virtual Reality			Customized Wellness Care			Intelligent Robots			Smart Cars		
	Influence	Present	Future	Influence	Present	Future	Influence	Present	Future	Influence	Present	Future
Macroeconomic	1. Economic growth level											
	2.05	2.54	3.2	2.31	-	-	2.28	-	-	2.56	-	-
	2. Percentage middle class											
	1.6	2.2	3.03	2.06	-	-	2	-	-	1.81	-	-
Social/ Environmental	3. Low birth rate/aging society											
	0.2	3.37	4.4	2.44	-	-	2.56	-	-	1.06	-	-
	4. Climate change/natural disasters											
	0.6	2.69	3.49	1.25	-	-	1.5	-	-	1.06	-	-
Cultural	5. Emphasis on quality of life											
	1.75	3.31	4.46	2.75	-	-	1.83	-	-	2.25	-	-
	6. Individualist tendencies											
	2	3.14	4.2	1.63	-	-	1.72	-	-	1.94	-	-
Regulatory	7. Negative-effect regulations											
	-1.65	3	3.3	-2.5	4	2.88	-1.89	2.11	2.44	-2	3.25	4.25
	8. Positive-effect regulations											
	1.9	2.5	4.3	2.63	1.25	3.25	1.94	2.56	3	2.63	3.13	4.63
Technological	9. Technological base conditions											
	2.05	2.45	4.1	1.75	2.19	3.88	2.17	2.28	3.67	1.81	2.88	3.88
	10. Technological maturity											
	2.55	2.9	4.15	2.31	2.38	4.31	2.33	2.78	3.94	2.38	3.31	4.56
Competitive	11. Market power of current-concept product & service operators/entry barriers											
	-2.1	2.8	3.45	-2.13	4.06	3.69	-1.83	2.28	3	-2	4.19	3.88
	12. Likelihood of success for new future industry market entrants											
	2.05	3.25	3.35	2.13	1.94	3.75	1.72	2.17	2.83	2.19	2.5	3.88
	13. Extent of substitution/improvement for current-concept products & services											
	2.29	2.86	4.36	2.5	1.65	3.83	2.28	2.48	3.9	2.02	2.37	3.59
Market	14. Essential goods status/usage strength											
	2.41	2.51	4.47	2.67	1.75	3.88	2.07	2.12	4.3	2.83	2.34	4.34
	15. Affinity for future technology											
	2.35	2.6	4.3	2.44	2.25	4.13	2.17	2.11	4	2.31	2.5	4.38
	16. Infrastructure costs											
	-2.3	3.6	3	-2.56	3.88	3.5	-1.89	2.56	3.89	-2.75	2.63	3.63

Note : 1) Average of expert questionnaire ratings for relationships of two forms of demand within each ecosystem.
2) Four-stage scale applied for “influence,” with values of 0 (does not apply), 1 (only minor influence), 2 (some influence), and 3 (large influence). Numbers in bold refer to top eight ranked industries for the 16 specific factors.
3) “Present” refers to current levels, while "future" refers to likelihood or predicted level on a ten-year time horizon. Measure is five-item Likert scale with values of 1 (very low), 2 (low), 3 (average), 4 (high), and 5 (very high).
4) Likelihoods for items 1 to 6 are identical for all areas of economy and society and apply commonly to all industries.

In terms of the influence of determinants on demand encouragement within the industry ecosystem, market and competition factors both had significant impact, while the results of social/environmental/cultural factors and regulations differed between industries (Table 1). As individual factors, ripple effects in terms of replacement of or improvement on current-concept product and service concepts placed in the top tier for both absolute value and intra-industry ranking alongside strength of product/service usage, technological affinity, and infrastructure costs. Growth levels also had a large impact, but industries differed in terms of the effects of the percentage of the middle class population. In terms of technological trends, maturity had a large ripple effect but only a small role in base conditions.

Predictions for the areas of macroeconomics, society, environment, and culture may be defined as “general” in terms of their likelihood of occurrence. While a rather troubling situation of sustained low growth, skewed income distribution, population aging, and climate change was observed, the quality of life and tendency to value individualism appeared likely to increase. In terms of industry-specific predictions, improvement was expected in the areas of technological maturity, usage scope, and ability to replace existing products. The market power of businesspeople as currently conceptualized, however, was predicted to remain at a high level regardless of whether it increases or declines. Infrastructure costs were found to differ among industries.

(2) Market Promise Rankings in Demand Terms

The above values for influence and likelihood were combined to calculate total demand encouragement for target industries, which was then used for an analysis of promise. When assessed in terms of total absolute level of demand encouragement (future promise [1]), customized wellness care was found to have the most promise of the four industries in the Plausible Scenario for a ten-year time horizon; smart cars and intelligent robots showed similar levels, with virtual reality ranking after them (Table 2). Because

Table 2. Future Promise Rankings and General Demand Encouragement Levels for Industries Analyzed

	Future Promise (2) (Difference between Best-Case and Plausible Scenarios)		Current Level of Promise (Difference between Best-Case and BAU Scenarios)		Best-Case Scenario (Potential demand encouragement level)		Plausible Scenario Future Promise (1) (Predicted demand encouragement level for ten-year time horizon)		BAU Scenario (Current level of demand encour-agement)		Worst-Case Scenario
	Reverse order		Reverse order		Ranking		Ranking		Ranking		
Virtual Reality	1	74.31	1	132.84	4	225.87	4	151.56	3	93.03	-12.91
Cus-tomized Wellness Care	4	100.08	4	196.87	1	274.2	1	174.11	4	77.33	-14.16
Intel-ligent Robots	2	90.08	2	142.15	3	254.55	3	164.47	1	112.4	-2.96
Smart Cars	3	90.32	3	150.16	2	254.96	2	164.64	2	104.81	-13.81

Source : Expert questionnaire data.

Note : 1) Total demand encouragement for each industry calculated through equation $\sum$ Market determinant influence × factor levels; differences calculated by subtracting a scenario's demand encouragement level from the Best-Case Scenario value.

2) "Levels" for each scenario: (i) BAU (current assessed level), (ii) Plausible (prediction for ten years from now), (iii) Best-Case (maximum values), (iv) Worst-Case (lowest values substituted).

3) Likert scales of 0–3 for influence and 1–5 for level.

this standard can be read as referring to market scale, with promise determined chiefly in terms of an industry being more or less "essential" with a wide scope of use, another standard is necessary to take industry-specific traits into account.

Accordingly, when promise was assessed in terms of how closely demand encouragement was predicted to approximate the optimal level achievable by an industry (ii) – i.e., the difference between total demand encouragement and the Best-Case Scenario (future promise) – the highest-ranked was virtual reality, which came closest to the optimal scenario, followed by intelligent robots, smart cars, and customized wellness care.

From a policy perspective, the first standard can be used as a basis policy formulation when the focus is on potential market scale, while the second can be used if the focus is on forming or visualizing markets as future industries, or on areas where South Korea could potentially emerge on a world-class level.

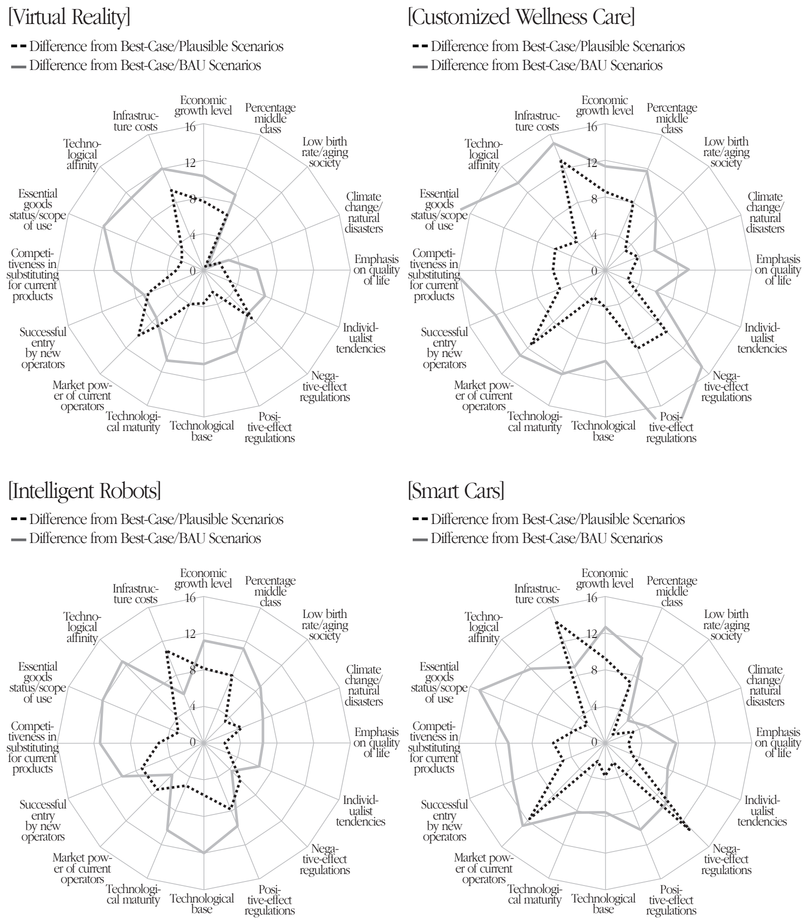
(3) Analysis of Factors in Demand Encouragement Underperformance

While the above assessment of promise in terms of a comprehensive score is meaningful, a more important concern is to calculate the Plausible and BAU scenarios back from the Best-Case Scenario[2] in order to identify pathways toward the ideal situation, which potentially offers implications for policy.

Figure 3 shows a determinant-based analysis of the difference

2) Refers to "backcasting" future prediction methodology.

Figure 3. Causes of Demand Encouragement Underperformance for Future Industries



Source : Expert questionnaire findings.

Note : 1) Refers to difference from optimal level in terms of individual demand encouragement associated with each factor. Values for Plausible (expected in ten years) and BAU (current assessed level) Scenarios were subtracted from the value for the Best-Case Scenario (ideal).

2) Points for each factor were calculated as follows: Individual demand encouragement level = Influence (0 to 3) x Level (1 to 5).

3) When interpreting "difference," gaps of 8 or more can may viewed as "extremely high," while a gap of 4 or more may be viewed as showing difference, since it represents the value for an influence of 2 multiplied by the difference between very high and average levels of 5, and 3 gives a total of five as the two demand relationships have been added together.

from the Best-Case scenario for the Plausible and BAU scenarios for ten-year predictions in each future industry.

Technological maturity is typically thought to be a key factor in future industry encouragement. The results of the analysis, however, show that while it is one of the important factors in demand encouragement underperformance, it ranks only around the middle.

Instead, the market power of product and service providers under the current concept (hospitals for customized wellness care, finished car makers for smart cars) was found to be the single largest factor limiting demand encouragement even ten years from now for the different industries. As low growth persists into the long term, economic growth scale (the growth rate) and quality (the percentage of the middle class) were found to be stumbling blocks to the marketization of all four industries, in both the present and future.

Other factors, namely the ability to replace or improve on current product concepts and the presence and usage scope of essential goods were found to show a high level of underperformance at present, but one that was expected to diminish going forward.

At the same time, growing infrastructure costs amid market expansion and limited negative-effect regulations such as personal information protections were found to account for persistent demand underperformance even in the Plausible future scenario ten years from now.

4. Policy Implications for Future Industry Marketization and Industrialization

(1) Shifting Priorities from R&D to Autonomous Industry Ecosystem Activity Perspective

① Importance of Non-Technology Factors and Policy Priorities

From the standpoint of the current administration's step-by-step strategy for future growth industries under analysis through 2020 (developed by related agencies in 2015), technological development occupied a priority position in the first stage of nearly all of the policies enumerated for each area.

As the analysis in the previous section shows, the technological aspect is indeed important for achieving marketization from a demand encouragement standpoint. At the same time, it also suggested that various other factors should also be taken into consideration, including macroeconomic issues, society and environment, culture, regulations and promotion policies, competitive elements between providers and products, and market elements related to goods themselves.

In other words, a change in perspective on priorities is needed, with a shift in future industry policy focus from R&D to an inclusive approach that incorporates various other elements.

② Feedback-Based Perspective Instead of Unidirectional Process from Technology to Final Demand

From a marketization perspective, the process of forming markets and industries rarely follows a unidirectional pathway. Instead, it typically involves the development of a technology that reaches a level of perfect realization, at which point operators appear at each ecosystem stage to sell products and services based on it, which then become subject demand by consumers. The idea of technological development leading to ecosystem formation exists conceptually, but the reality is different. Far more commonly, market demand exists in the form of tacit needs among individuals, which then lead to the development of technology in a process of continuous feedback.

If policies are implemented on the assumption of a unilateral pathway, a perpetually and independently operating ecosystem cannot take shape, leaving only a government-led ecosystem dependent on government R&D projects.

While R&D policy is certainly of importance in technological development for marketization and industrialization of future industries, it is important to consider platform policies, regulation and promotion policies (including various laws and institutions), and policies for both current-concept product and service providers and new providers as occupying the same or a higher level of priority rather than a lower one.

③ Policy Objective Function Changes for Budget Reductions and Efficient Marketization

If R&D development is made a chief objective function for policy, large budgetary costs become inevitable, as everything from source and base technology to applied and commercialized technology may become policy targets.

If marketization or ecosystem formation becomes the policy objective function, however, technological development becomes one among many policy approaches. Occasionally, other policies not related to technological development may be prioritized to encourage autonomous technological development in the private sector; the most urgent technologies emerge during this ecosystem formation process, at which point the government acts to support development of those key technologies.

This process can lead to future industry fostering budgets being reduced in comparison to when R&D development is made the policy objective function, and because it leads to an independently operating ecosystem rather than a government-dependent one, it may also be efficient in encouraging marketization.

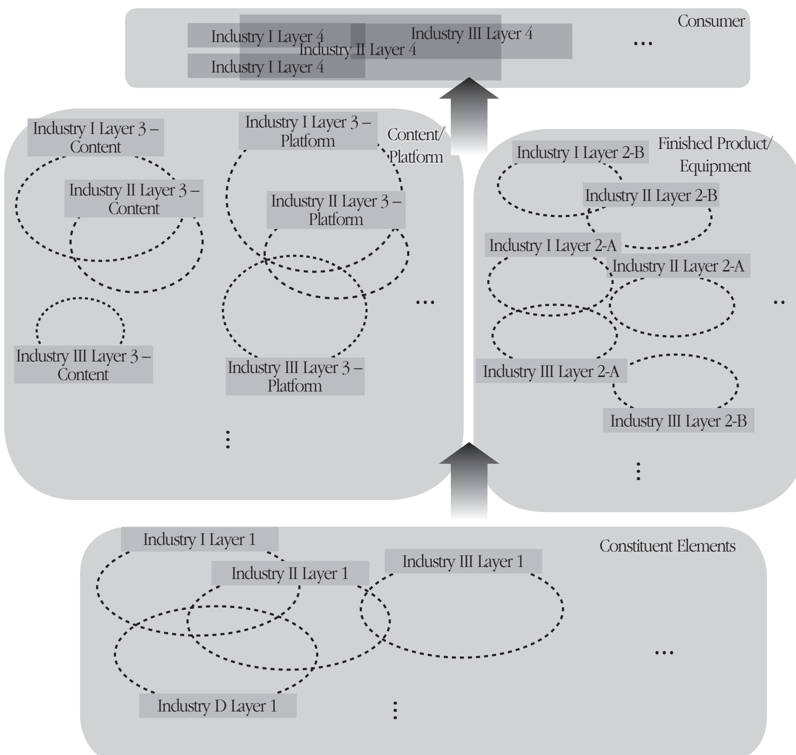
(2) Demand for Policy Development from a General South Korean Industry Ecosystem Perspective

① Recognition of the Sharing of Ecosystem Actors among Industries

In addition to the aforementioned shift in perspective from individual industries, an additional policy perspective can be identified in terms of the general South Korean ecosystem between industries.

Because future industries are characterized by aspects of fusion and convergence, analysis of ecosystems may show similar products and services or constituent elements overlapping between industries, with identical suppliers. This sharing within the industry ecosystem may be more prominent in terms of basic constituent elements, but it also appears in content, platforms, and final goods equipment.[3] If the trend of fusion and convergence spreading to existing industries is also taken into account, the general South Korean industry ecosystem may be represented as in Figure 4.

Figure 4. Conceptual Diagram of South Korea's General Industry Ecosystem



Source : KIET.

---

3) Strictly in terms of the four future industries analyzed, the precision sensor element is shared by virtual reality, intelligent robots, and smart cars, as are human-robot interfaces in the broad sense. Immersive displays may offer similar forms of equipment and software for virtual reality and smart cars. For customized wellness care, some diagnostic equipment elements may be used as physical response input elements in virtual reality, and communications network

② Additional Pathways for Joint Management of Sharable Elements

Because the South Korean government's policies for fostering future industry tend to be focused on individual industries (as with lists identifying "such-and-such number of future growth engine industries"), road maps tend to be developed separately and specific projects designed for different industries, a situation that remains divorced from the general industry conditions described above.

When developing policies to foster future industries, it may obviously be very difficult and inefficient to formulate separate policies for separate technologies or issues, or to locate each and every corresponding industry in order to further flesh them out. In the case of elements that may be commonly used between industries, the necessary technologies may differ when those elements are used by Industry A as opposed to Industry B, and some industry-specific aspects may exist.

In terms of basic source technology, however, shared elements are unquestionably present, and if pathways exist for their use as a basis for coordination and joint management of policy efforts, it may be possible to ameliorate financial waste and boost project efficiency. Under the current system, situations arise in which policy efforts of similar natures are launched separately from the start in both Industry A and Industry B, with the managing agents either utterly unaware of each other or lacking in information.

Even if the current system of separate policies for separate in-

---

infrastructure and driver health condition content may be shared with smart cars in platform and content terms.

dustries is retained, it is necessary to create systems in which new and separate pathways for coordination are formed for the joint management of technologies, platforms, and content that is similar or sharable.

③ Flexible and Rational Response to Redundancy

Perhaps the most feared side effect from creating such a system is the exacerbation of redundancy-related concerns for various projects.

It should be noted, however, that the reason for proposing this reality is not to reduce budget costs by eliminating all seemingly redundant efforts and executing only a single whole, but to encourage development and commercialization through a systematic approach to targeted technologies, content, and platforms from source to base and application. Rather than eliminating different policy tasks because they bear similar titles or categories, it may be possible to minimize this side effect by assuming overall progress and the presence of areas of shared and specific use for individual technologies and orienting policies in order to assess individual tasks with the goal of systematic development.

(3) Industry Organization Policies from a Market-Establishment Perspective

The analysis in the previous section showed market organization issues to be one of the chief factors inhibiting demand encouragement, as well as one that is expected to remain unresolved or worsen over the next ten years.

To be sure, market and industry organization-related issues such as the market power of current-concept operators and the success of advancement by new future industry operators would be considered, in economic terms, to be part of supply-side policy.

It is also necessary, however, to approach the issue from the perspective of demand encouragement and market formation. While a wide range of factors determine demand directly – including object quality, consumer preferences, and purchasing power – market expansion remains minimal when current-concept operators are too powerful and future items and services are shut out at the source. In some cases, those items and services may reach the market in compromised form following negotiation with those stakeholders, which results in their being shunned by consumers for failing to meet their needs. In other words, latent demand within the minds of the public may or may not manifest as actual demand, and markets may or may not take shape, depending on policies regarding operators.

From this perspective, it is crucial (i) to bolster current policies such efforts to foster venture enterprises and aid new future industry operators in their successful advancement. Sufficient consideration should be extended here to (ii) not merely having new future industries exist in name only, but examining in terms of institutions and fair transaction practices whether the market power of current operators is not hampering the launching of products and services in the original sense. At the same time, current-concept operators should (iii) be encouraged to concurrently or exclusively adopt future industries while aiding the promotion of a future industry market, rather than continuing a wasteful competition between current-concept product and service providers and new future industry operators.

(4) Micro- and Macro-Level Policy Combinations to Promote Future Industry Demand

As a reflection of long-term low growth conditions for the South Korean economy, economic growth level was found to be a factor applying pressure on the demand for future industries both at the present time and in the future.

Even when other conditions are met, diminishing growth may function to inhibit marketization and industrialization by limiting future industry demand, leading to a vicious cycle in which weakening new future growth engines result in a drop-off in macroeconomic growth over the long term.

Policies for future industries involve various measures, ranging from R&D support to legal and institutional changes and additions, as well as infrastructure building. While it is not the conventional approach to future industry policy, efforts to promote demand through income policy should be considered as a means of preventing the aforementioned vicious cycle.

Once demand for future industry products and services has been encouraged through tax benefits or income preservation efforts involving subsidies for purchases by all or some income segments, the results may be beneficial for promoting the overall industry ecosystem, including demand not only for final goods but also for constituent elements. Extensions of preferential treatment to current domestic products risks violating international trade norms, and effective policy implementation is constrained by the large amount of overseas production by domestic businesses. For new future industry areas, however, relatively few of these constraints exist, which may have a positive effect on such a policy approach.

(5) “Plan B” Measures for Industries Excluded from Policies

As was the case with this study, predictions of promising industries are fundamentally speculative, and the selection of policy targets is determined by the policy objective function, i.e., values. It may therefore be natural for policy industries to change over time as information is updated and policy decision-makers are replaced, as long as the scope and cycles of change are not excessive.

The main issue here is the need to minimize social costs. When changes in policy industries result in support being suspended, preventing further development in that area, the existing inputs generally become social costs. When areas previously removed from policies are included once again as eligible for support, the result may sometimes be a double input cost, as R&D support is instituted anew from the base technology level. If competitor nations have continued with their own research and commercialization and further surpassed South Korea during that period of suspension, this increases the social costs in terms of tacit opportunity costs.

For this reason, “plan B” measures must be put in place so that support for areas is not fully suspended in the event of policy industry changes, but is able to continue at least in part even after reductions. In other words, if marketization is failing and support for an area is discontinued because of a lack of immediate demand, it should not be completely abandoned. Rather, continued development is necessary if it is to respond immediately or lead the market when future market activity arises. Such a strategy may be difficult for private enterprises that seek to maximize short-term profits, but state-run institutions, universities, and research organizations should at least be encouraged to pursue some degree of continuity in these industrial areas rather than adopting a short-term perspective.