

Reading Rationality of Decision-Making Called Site Selection : the Case of Sematech

입지선정이라는 이름의 의사결정에 있어서의 합리성 읽기: Sematech 사례

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이 연구는 1988년 미국 반도체 업체들의 연구 컨서시엄인 Sematech의 입지선정 사례를 통해 의사결정에서 표출된 합리성의 양태를 살펴본다. 최종적으로 Sematech은 12개 후보지 중 텍사스주 어스틴시를 입지로 선정하였는데, 이 연구는 어스틴시의 선정이 경제적 합리성을 중심으로 하는 전통적 합리성의 기준에 부합하지 않는다고 평가한다. 그 이유는 매사추세츠와 뉴욕주가 텍사스주가 제안한 조건보다 더 나은 조건을 제시했다고 평가하기 때문이다. 이 연구는 이러한 판단으로부터 Sematech의 입지선정을 좌우한 결정적 요인은 합리성이 아닌 정치적 타당성이라고 평가한다. 실제로, 이 연구는 텍사스 출신의 상하원 의원들이 워싱턴 정가에서 강력한 영향력을 발휘함으로써 Sematech을 유치할 수 있었다는 몇가지 정황증거를 제시한다. 결론적으로 이 연구는 합리성은 상당히 모호한 개념이며, 의사결정이 언제나 합리성이라는 척도에 의해서만 이루어지는 것은 아님을 확인한다.

Key Words : Sematech, Austin, TX, rationality in decision making, political feasibility, site selection

I. Introduction

This study discusses the implication of rationality appearing in actual decision-making through a site selection case. Because rationality is a composite concept, people interpret it depending on their own standpoint. Unsurprisingly, the recognized concept has an extremely wide range depending on users. The kernel of rationality is considered economic rationality¹⁾ based on the model of rational economic man (Earle, 1995). If the common

1) This study focuses on Diesing's suggestion. The concepts of rationality suggested respectively by Weber, Mannheim and Simon are outside the scope of this study. This study does not consider social rationality and legal rationality of Diesing's ideas of rationality, either.

thinking is a solid fact, all decisions should be made only by economic cost-benefit analysis which is heartlessly value-free. However, reality shows that such thinking exists only in the idea. In this regard, this paper identifies the status and refraction of 'rational decision-making' in reality through a site selection process.

This study is a case study. The target case is the site selection process of Sematech headquarters located in Austin, TX. Therefore, the finding of this study does not directly bear out the limitation and problem of rationality as a concept. It just identifies the substance of rationality as an ambiguous concept and the difficulty of optimal decision-making.

Following is the structure of this study. Chapter II discusses some concepts of rationality and political feasibility. Also, the chapter surveys the overall neoclassical location theory. The chapter supplies the basic framework sustaining this study. Chapter III describes the whole site selection process of Sematech. Through the chapter, this study discusses the rationality of the site selection and the limitation of rationality as an idea. As the conclusion chapter of this study, Chapter IV identifies the implication of site selection of Sematech and the aspect of rationality appearing in the site selection process.

II. Basic Concepts

1. Rationality and Political Feasibility

1) Some rationality concepts suggested by Diesing

In the area of public administration, rationality mainly means to admit given goals and realities and to search for optimal means to actualize the goals (Jeong, 1998). The means-end construct is the backbone concept of the rationality, which is concretely called technical rationality. Technical rationality thinks most of effectiveness of means to achieve the goals. Accordingly, the achievement level of the outcome becomes the barometer measuring the rationality. Meanwhile, economic rationality means efficiency related to cutting costs in addition to the achievement of goals (Diesing, 1962). Cost-benefit analysis is an effective tool to measure efficiency. Therefore, economic rationality is mainly employed when more than two alternatives are investigated to be selected. Unsurprisingly, the two concepts of rationality are located in the same context. The two concepts share and intend to characteristics of mechanical objectivity and heartless value-neutrality. In terms of this, Kim (2000) classifies the two concepts as a category of 'structural rationality.'

Usually, we consider political decision-making as an opposite concept of rational decision-making (Jeong, 2001). Here, the concept of 'political' implies that a decision is made by the political reciprocate of interest groups. However, policy-making is not a product of pure technical or economic rationality. Rather, actual policy-making is a joint

production of the technical/ economic rationality and political consideration.

2) The concept of political feasibility

In this regard, the possibility of political support in the selection and implementation of a policy alternative is called 'political feasibility' (Jeong, 2001). Several political scientists consider that political feasibility is one of the most important factors in policy-making because policy-making is nothing but a political process (Baker et al., 1975). Political feasibility is dominated by the political power of pertinent interest groups. It is connected to the pluralist view that a policy is formed by competition between pertinent interest groups in a policy-making process. The pluralist view understands that all interest groups want to intervene and affect a policy-making process to make the consequent policy favorable for themselves.

Because political feasibility depends on the support of existing political power, the better-represented group can make the consequent policy favorable for themselves at the expense of the less-represented group. In that case, political feasibility is often understood to play the immoral and 'irrational' role.

Political feasibility is a different concept from political rationality. Political rationality is mainly suggested by Diesing (1962) and Wildavsky (1975). Diesing puts that all policies suggested should consider their political impacts. He insists that a policy alternative should be rejected even if it can contribute to settling socio-economic problems, if it creates or aggravates political problems. On the contrary, if a policy alternative can improve a political situation, it can be accepted although it is not the best socio-economically according to him. Wildavsky more generalizes the concept of political rationality than Diesing. Suggesting the concepts of political cost and political benefit, he insists that there exists political rationality if the latter is bigger than the former.

After all, political feasibility means a politically established thing or the extent of political support whereas political rationality means to search for a politically desirable thing. Therefore, to correspond political feasibility with political rationality or other ideal values, existing political power should be distributed to all classes and groups equitably. However, it is merely an ideal. Even in the US called the most plural society, the estrangement between political feasibility and political rationality is often found (Jeong, 2001). This study deals with an actual case that political feasibility was alienated from rationality.

2. The Neoclassical Industrial Location Theory

1) Concepts

There are several epistemological trends in the location theory. That is, the location theory is classified roughly into the neoclassical approach, the behavioral approach and the structuralist approach. However, this section focuses on the neoclassical approach (refer to

Glasson, 1975) because the approach is based on rational economic man hypothesis and values much of the rationality issue (Earle, 1995).

The neoclassical location theory derives its origin from Alfred Weber's 'least cost approach.' The approach suggests that the optimal location for a plant is the place where aggregate cost required to be located is minimized. In the pertinent cost, considered are transport costs, labor costs or wage level and agglomeration economies. While Weber insists that location cost is critical in location dynamics, Lösch stresses that aggregate revenue should be considered most important in location decision. That is, according to him, businesspeople look for some place where they can maximize market share or sell their products at the maximum. The approach is called 'market area approach.' From that time, Isard and Greenhut suggest 'profit maximization approach,' respectively. The approach puts that the optimal site is neither the place with least cost nor the place with maximized revenue. The optimal site is simply the place where the profit is maximized. Profit gets maximized when cost is minimized and, simultaneously, revenue is maximized, as it is a function of the two variables. In sum, profit maximization approach is the composite of two approaches stated earlier. Also, the approach is the intensive spatial expression of economic rationality based on efficiency.

2) Limitations

The neoclassical approach discussed above is criticized because of the following points. First, the approach is based on unfeasible assumptions. Particularly, rational economic man hypothesis considers reality excessively simple (Earle, 1995). The behavior of human beings is not that simple. In that context, the behavioral approach mentioned above is suggested. Second, the approach considers pertinent variables inadequately. Third, the approach does not consider political rationality and political feasibility, which are critical factors in actual decision-making. Fourth, the approach is inordinately abstract and notional. It lacks legal, institutional and socio-cultural consideration. Unsurprisingly, it cannot help sinking to void argument. Fifth, the approach considers only the location behavior of a plant. However, in reality, a site decision is a product of the relation or competition and influence between rival companies. The neoclassical approach inadequately considers such relational aspects. Sixth, although the approach assumes that there is one optimal site in one case, there exist several appropriate sites in actuality. After all, the limitations of the neoclassical approach are summed up the restrictions of rationality itself (Kim, 2000: 14).

III. The Site Selection Process of Sematech

1. Background information

1) Why does Austin attract some attention?

Here, we identify the reason why this study chooses Austin as the target of the case study, looking into the current status of Austin.

Austin called Silicon Hills is currently one of the leading centers of the high technology industry. High-tech employment in the region almost doubled from year 1990 through 2000, adding close to 50,000 high tech jobs (Greater Austin Chamber of Commerce, 2002). The population of the City of Austin is 656,562 people as of April, 2000 (City of Austin, 2001). Also, the number of the metropolitan area is 1,249,763 in 2000 (City of Austin, 2001). The number of technology-based companies now exceeds 2,500, employing more than 95,000 Austinites (Greater Austin Chamber of Commerce, 2002). There are several top-tier high-tech companies in Austin. Dell, a Fortune 500 company, for example, with 16,000 employees is headquartered in Austin (Greater Austin Chamber of Commerce, 2002). Also, Motorola, IBM, and 3M are critical growth engines of Austin. Austin is growing a concentration center of many leading online game developers in the world (*Chosun Ilbo*, 2002). Today, Austin (55.5%) is reported the city with the third highest internet-users rate in the US following Washington DC (59.9%) and San Francisco (56.1%) according to *the Washington Post* (Shannon, 1999).

Several analysts identify the solid growth of Austin. In the September issue of 2002, *Money*, an authoritative business magazine, chose the Austin metropolitan area as one of the best seven places to live out of 300 US metropolitan areas. The livability is assessed based on the measures like economic condition, educational opportunities, crime rate, environmental condition, cost of living, cultural amenities and recreational opportunities. Then, we need to pay attention to what the choice is not transitory but has been repeated since the 1990s. For example, in 1996, Austin was chosen the seventh runner-up by the same survey (Fried, 1996). Particularly, Austin has appeared to enjoy great economic conditions according to several reports (Fried, 1996; *Economist*, 1997; Wieners and Hillner, 1998; Kim, 1998). In 1996, the unemployment rate in the area was 3.5 percent while the national average was 5.3 percent. Some analysts are quick to suggest that Austin is the forerunner of the next generation of technopoles following Silicon Valley (*Economist*, 1997; Wieners and Hillner, 1998).

2) What is Sematech?

SEmiconductor MAnufacturing TECHnology initiative (Sematech, now International Sematech) is a public-private consortium created to insure US capabilities in producing advanced semiconductors for military and civilian purposes and to increase the US competitiveness in

the world market by 14 major US chip makers. The initial consortium members were AT&T, AMD, LSI Logic, Digital Equipment, Hewlett-Packard, Intel, IBM, Texas Instruments, Motorola, National Semiconductor, Micron Technology, Harris Corp., Rockwell International and NCR. In 1987, Sematech was incorporated as a non-profit, tax-exempt corporation. The major funding sources were the US Department of Defense and the US semiconductor industry. The annual operating budget of the company was \$250 million. It was backed up by \$600 million in federal subsidies.

Sematech has the following three missions: to carry out R&D on advanced semiconductor manufacturing techniques; to test them on a demonstration production line; and to transfer the advanced techniques to US producers. Unsurprisingly, Sematech does not produce a commercial product.

3) The Austin situation in the mid-1980s

In 1983, Austin, TX was selected as the headquarters of MCC. MCC, the Microelectronics and Computer Technology Corporation is an R&D consortium in the area of microelectronics. MCC was born as a joint R&D venture of 10 leading US corporations in 1982. The budget was planned between \$50 to \$100 million per year. The research areas were targeted to advanced computer architecture, component packaging, software technology and computer-aided design and manufacturing. To win its headquarters, 57 cities from 27 states in the US joined the competition in 1983. Austin finally won it from such final competitors as Atlanta, Raleigh-Durham and San Diego.

The Austin economy was rapidly overheated after the city won MCC. Particularly, the real estate market was extremely corpulent in the mid-1980s (Kim, 2001). Land and housing prices, and rent were skyrocketed day after day. However, in late 1986, the bubble began to get broken. In 1987, Austin had the largest office vacancy rate in the nation. Unsurprisingly, office and apartment rents dropped dramatically. Also, unemployment rapidly increased²⁾. The cause of the rapid economic downturn is mainly found in Austinites' baseless expectation to the future. They thought that Austin would be 'the second Silicon Valley' sooner or later. What they did before anything else was to construct buildings. They estimated that 'the second Silicon Valley' would need many offices and apartments. They were immersed in speculation. The nationwide economic downturn severely smashed the superficial expectation and the local economy. Moreover, MCC, an R&D consortium employed no more than 300-500 employees. Therefore, the overall employment effect was extremely limited and expected economic effects were not actualized.

In that context, the city had to find a new growth engine to reverse the situation. Sematech was the great opportunity. All the Austin community and statewide support were united to win the consortium (Gibson and Rogers, 1994).

2) All the pertinent indicators and statistics are identified in Kim (1998).

2. The Site Selection Process

To decide the US semiconductor industry's hub, Sematech employed open inter-state competition. On May 20, 1987, the site-selection committee released a three-page request for proposals to the governors of all 50 states and Puerto Rico. One hundred and thirty-five sites in 34 states submitted their proposals. Sematech chose 12 finalists among them. The finalists were Arizona, California, Colorado, Florida, Massachusetts, Missouri, New Mexico, New York, North Carolina, Oregon, Texas and Wisconsin. Finally, the Sematech board chose Austin, TX as the site on January 5, 1988.

1) General categories required by Sematech in the site selection

The consortium officially announced to consider the following categories in the site selection (Knutson, 1989: 2). An interesting thing is that aforementioned traditional location factors were rarely considered by the consortium in the official announcement at a minimum.

(1) The facility

Sematech required adequate contiguous land that could accommodate short- and long-term objectives. The following conditions could conceivably satisfy the requirements of Sematech:

- a. A site with an existing semiconductor facility of 150,000 to 200,000 sq. ft. with 25,000 to 30,000 sq. ft. of cleanroom space. The operation would have to be capable of offering state-of-the-art production standards, that is, capable of producing semiconductor wafers with submicron surface features;
- b. A site with an existing building within the overall dimensions stated above; and
- c. An open space with no structures that would be suitable for the additional construction of Sematech facilities.

(2) Sufficient support services

Sematech required a site to sufficiently supply water, electricity, sewer and waste treatment, and gas. Also, the consortium thought much of the existence of existing semiconductor industry and supporting services close to the candidate site. It can be assessed as the consideration of agglomeration economies. Another consideration point was that the site had to be environmentally clean.

(3) University support

Sematech required the presence of excellent research universities to provide synergism with Sematech.

(4) Business climate and quality of life

The traditional location factors mentioned above are partly related to this part. However, it is true that their relative importance was poorly considered in the site selection process. Following items were considered by Sematech in this part:

- a. community attitude and involvement;
- b. state and local support;
- c. availability and quality of skilled labor force;
- d. quality and cost of housing;
- e. locally and nationally convenient transportation;
- f. quality of education system; and
- g. amenities.

(5) Economic incentives

The incentives considered were grants, loans, tax abatements, leases, gifts of land and buildings, interim use of facilities, infrastructure developments and so forth.

2) Bids of the finalists

The aforementioned finalists offered every possible incentive package to recruit Sematech. Following are the contents of the packages proposed by the 12 finalists.

(1) Arizona

Austin American-Statesman, the only local paper in Austin, estimated that Phoenix, Arizona and Boston, Massachusetts were the strongest rivals of Austin, TX in the competition (Tyson, 1988: A8). Initially, the Arizona proposal included no state-funded incentives. However, the Arizona officials changed their strategy when they knew the strong support of Texas' congressional delegation to Austin. It increased Arizona bid. The Arizona bid included an increase in the subsidy for Sematech to rent the established SGS headquarters and plant in Phoenix. The Phoenix Economic Growth Corporation (PEGC), which had overall responsibility for the Arizona bid, suggested some high-ranking officials of the city to purchase the plant with bond issue. The SGS plant was 280,000 sq. ft. facility with 22,000 sq. ft. of cleanroom. The plant was rated a top-tier facility.

The proposed subsidy totaled \$201 million. It included rental support to the plant, tax exemptions, university research funds, employee transition and relocation support, and discounts to utility rates. "We had the most competitive proposal ever developed for the state of Arizona," head of PEGC said (Thomson, 1988: 5).

(2) California

The California proposal was focused on a site of the Cambrian Business Park in San

Jose. The site was owned by a developer at that time. The State of California offered \$25 million grants a year over 5-year period at no cost to the manufacturing consortium. The City of San Jose also offered \$2 million cash and the waiver of fees and taxes equaling another \$7 million. "We told Sematech we would help them with interim financing if necessary," said a state official. "Ours is the best package, because it is direct grants, not loans" (Copelin, 1987: A10).

Another strength of the state was that a large number of high-tech companies are distributed in Silicon Valley including San Jose. That is, Silicon Valley has strong agglomeration economies in high-tech industry. Indeed, many of the member companies of Sematech have been headquartered in the area. What Sematech's interim headquarters was located in Santa Clara was an advantage of the area in the same context. Finally, nobody denies the excellence of Californian research universities.

(3) Colorado

The Colorado proposal was centered on the site of the United Technologies Microelectronics Center (UTMC) in Colorado Springs. The proposal offered a quarter of the 260,000-sq.-ft. UTMC facility as the site for Sematech. The proposal offered 25,000 sq. ft. of office space, a 25,000-sq.-ft. area for a cleanroom and 15,000-sq.-ft. area for cleanroom support equipment.

Like the case of Arizona, initially, the state did not include any type of cash incentives. "We don't have the budget a lot of states do," a high-ranking state official said (Thomson, 1987: 4). However, while the competition became fierce, the state offered \$50 million in low-interest loans, \$3 million to \$4 million in improvements in engineering-related programs at the university, a \$1 million grant and another \$1 million in private gifts. However, the real competitive edge of Colorado was its beautiful natural environment. "We're putting our mountains on the table. It's our quality of life we're stressing" a Colorado official said (Copelin, 1987: A10).

(4) Florida

The Florida proposal offered Sematech to be located at the University of South Florida's Research and Development Park in Tampa. The legislators who originally had rejected to offer Sematech some financial incentives changed their attitudes. In a special session, the Legislature pledged \$35 million for construction of a plant and start-up costs. Like the case of Colorado, good quality of places is the strength of Florida alone incomparable with other states.

(5) Massachusetts

Massachusetts was one of the strongest bidders in the competition. Gov. Dukakis who had gone in for the presidential race keenly wished to recruit the consortium to best

publicize the high-tech success story of the Greater Boston Area, his greatest marketing point in the race. Indeed, the incentive package of Massachusetts looked the biggest.

Massachusetts offered a \$200 million line of credit, \$93 million in interest and tax credits and lease of the fully equipped Massachusetts Microelectronics Center (MMC), a \$58 million facility in Westbro. The Legislature also approved capital and operating grants for the consortium totaling \$75 million.

MMC, the offered site was created by the state in 1982 and was funded in conjunction with corporate donation. It was affiliated with 10 universities and was designed for electronic and computer engineering students. The center also included a capacious IC (integrated circuit) fabrication.

(6) Missouri

The AT&T facility in Kansas City was proposed as the site. The facility was intact and had been producing megabit DRAMs. The fabrication had two cleanrooms. One of them was completely stocked with equipment including 23 GCA model 6,300 lithography systems and implanters from both Eaton and Varian.

(7) New Mexico

Austin American-Statesman estimated that the bid of New Mexico had considerable competitiveness (Tyson, 1988: A8). New Mexico offered Sematech the use of an advanced research center at Sandia National Laboratories and about \$17 million in other proposed benefits. The Governor asserted that the federal laboratory was the best in the world (Tyson, 1988: A8).

(8) New York

Rensselaer Polytechnic Institute (RPI) had spearheaded the New York bid, which also included several other Northeast engineering schools³⁾, which offered Sematech a complex of facilities on the RPI campus in North Greenbush, near Troy. The academic consortium encompassed Rochester Institute of Technology (RIT), Cornell, MIT, Carnegie-Mellon, New York University and Columbia. The consortium led by James Meindl, RPI provost, a key figure in building Stanford University's semiconductor research program.

In the proposal, RPI made available its Center for Manufacturing Productivity, its Center for Integrated Electronics and its Center for Industrial Innovation as a part of package that also included the resources of the RIT and the semiconductor laboratory at Cornell. The proposal included a \$40 million incentive package. Another \$40 million was added to sweeten the pot, as the Sematech decision drew near.

3) Copelin (1987: A10) called the New York bid 'Northeast Schools' bid,' because the academic consortium encompassed all the excellent Northeast research universities.

(9) North Carolina

North Carolina with Research Triangle Park, a top-tier high-tech hub in the world was one of the strongest contenders in the Sematech race. Its bid was supported by what it was the home to the Semiconductor Research Corp., a similar consortium to Sematech. It was financed by 40 chipmakers including the 13 Sematech member companies. Its president, Larry Sumney was Sematech's interim managing director, when Sematech searched for its headquarters.

Some reports⁴⁾ identified that North Carolina offered the Microelectronics Center of North Carolina (MCNC) in Research Triangle Park as the site (Copelin, 1987: A10; Pinholster, 1987: 43). MCNC is a consortium of five North Carolina academic institutions, Duke, NC State, UNC at Chapel Hill and Charlotte, and North Carolina A&T State University. The consortium provides education and research programs to support the development of microelectronics technology. The State Assembly set aside \$8 million for Sematech and appropriated \$18 million for a supercomputer shared by the research universities and Sematech (Copelin, 1987: A10).

(10) Oregon

The offered Oregon site was a facility vacated by Lattice Semiconductor. The building had 144,000 sq. ft. of space including a cleanroom. Relatively, the bid contents were most unseemly among the competitors.

(11) Texas

The Texas proposal offered a vacant 300,000 sq. ft. plant owned by Data General on the south side of Austin. Austin's financial incentive package totaled \$68 million. Although the size was reduced, the format of the package was very similar to the one provided for MCC.

The existing industrial network was a big strength of Austin. Seven of Sematech's members were MCC shareholders: AMD, DEC, Harris, Hewlett-Packard, Motorola, National Semiconductor and Rockwell. Moreover, six of Sematech member companies already had manufacturing plants in Austin: AMD, AT&T, IBM, LSI Logic, Motorola and Texas Instrument. In addition to the industrial network, the location of University of Texas was another strength of Austin. The university had strong research programs in the field of semiconductor.

(12) Wisconsin

The Wisconsin proposal offered temporary space in a building in the University of Wisconsin at Madison for three years, a period during which permanent facilities would be

4) North Carolina state officials officially declined to provide any information about its bid at that time.

constructed on the university's research park, 15 miles south of Madison. Wisconsin incentives proposed to Sematech totaled \$14 million from the state and the city. The University of Wisconsin at Madison is an excellent research university in the area of semiconductor. Its research on X-ray lithography was applied directly to how circuitry is projected onto semiconductor wafers.

3) Objective weaknesses of the finalists

Site selection is decided not only by comparing strengths of candidate sites and the size of incentive packages offered by them but also by comparing weaknesses of the pertinent sites. Site selectors always decide a location through comparing positive sides with negative sides of pertinent sites. Here, in this regard, this paper investigates the reported weaknesses of the finalists.

(1) Arizona

The weakness of the Arizona package was that the state had relatively weak university programs in the area of semiconductor.

(2) California

First of all, the San Jose site offered did not have a cleanroom. The lack of a cleanroom would be an unusual weakness, compared with other competitors' candidate sites that already had it. But the state officials promised Sematech to build it as soon as possible. Even, Austin, the winner of the competition lacked the facility. Therefore, it is difficult to say that the lack of a cleanroom was a critical weakness excluding the California package.

Rather, *San Jose Mercury News*, the local paper pointed to attitude problems such as arrogance, disorganization, parochialism and the lack of coherent strategy as critical causes losing the competition (Schmitz, 1989: 6D). The Deukmejian state administration was relatively inactive to attract the consortium. For example, while other governors were personally courting the site selection committee, the governor sent emissaries. A San Jose official blamed the governor's attitude: "our governor sent somebody else, who brought a proposal so devoid of substance it became a laughingstock and almost eliminated us from competition right then" (quoted in Feibus and Kutzmann, 1988: 4A). Although it is hard to believe that the committee eliminated the San Jose package due to that reason, it is reality that such unreasonable decision is often made. Sematech site selection committee unsatisfied with the state's presentation assessed it the worst proposal they had received (Feibus and Kutzmann, 1988). Even the city officials blamed the state officials poorly presenting the proposal (Thomson, 1988: 5).

The governor who realized that the state's bid was in big trouble late pledged \$125 million over five years and the quick construction of a cleanroom (Feibus and Kutzmann, 1988: 4A). However, the final result showed that it was too late. Sematech doubted that the

governor could deliver the money, given the state's inability in overcoming partisan politics: "there was no clear level of consensus that 'we want this, and we're going to get it together'" remembered the chair of the site selection committee (quoted in Gibson and Rogers, 1994: 491).

(3) Colorado

As the state officials admitted, first of all, the incentive package of the state was far smaller than those offered by other contestants (Thomson, 1988: 5). In addition, the UTM site offered by the state was not a vacant building, and the plan that Sematech took over a part of the building and shared other parts sounded unrealistic. Also, amenity factors emphasized by the Colorado proposal were rarely deliberated in the actual decision-making. The factors were no more than the secondary factor considered by the site selection committee. In addition, what the university research program related to semiconductor did not reach to a satisfactory level was another weakness of Colorado Springs. The University of Colorado at Boulder, the flagship university of Colorado is located in 120km distance from Colorado Springs.

(4) Florida

Tampa, the offered site did not have a cleanroom ready to go. Additionally, the cash incentive offered did not look great, compared with other states' packages. Also, what the university research program related to semiconductor did not reach to a satisfactory level was another weakness of Tampa. The University of Florida at Gainesville, the flagship university of Florida is located in 150km distance from Tampa.

(5) Massachusetts

Although the Massachusetts proposal offered Sematech huge amounts of financial incentives, \$441 million, about half of the amount, \$200 million was a low-interest loan. It held some problem. Because the consortium's main partner was Uncle Sam, Sematech did not need to worry about borrowing money from some place. Thus, in fact, the seemingly big proposal was more inflated than the actual proposal. However, it is impossible to deny that \$241 million, the rest part of \$441 million were still big money. The biggest strength of Massachusetts as industrial location is the existence of MIT. However, MIT was included in the New York bid in the Sematech race. Therefore, the Massachusetts package lacked the spearhead of the bid.

(6) Missouri

Its suggested site at Lee's Summit was dominated by a huge AT&T facility (Gibson and Rogers, 1994: 495). Not surprisingly, other member companies evaded going to the place mainly influenced by AT&T. Also, what the university research program related to

semiconductor did not reach to a satisfactory level was another weakness of Missouri.

(7) New Mexico

Most of all, New Mexico's proposal was low on cash incentives (Gibson and Rogers, 1994: 484). Additionally, after the final announcement of site selection, Sen. Jeff Bringaman, D-NM indicated its relatively weak education system as a cause of the failure (Tyson, 1988: A8). Indeed, there were few research universities with some reputation in the field of semiconductor in New Mexico.

(8) Texas

The suggested Data General plant did not have a cleanroom. In addition, the financial package offered by Austin did not overwhelm other contenders' ones unlike the case of MCC. It was just a 'not-bad' level. It mainly resulted from the city's serious economic downturn.

(9) Wisconsin

Its temporary facility suggested lacked a cleanroom. Also, the financial incentive suggested was relatively lean.

4) Summary

<Table 1> describes the contenders' strengths and weaknesses. <Table 1> provides the chance to simultaneously compare the contenders' strengths and weaknesses. However, it does not cover the behind story and political consideration. <Table 2> synthetically sums up each bid proposed based on the description of <Table 1> and the site analysis⁵⁾ of Kim (1998).

<Table 2> identifies that, in the visible and objective standpoint, the packages of California, Massachusetts and New York were the best three of the 12 proposals. The proposal of Texas, the real winner was no higher than the tier-three level following the ones of Arizona and North Carolina. The proposal of California could be eliminated from the consideration due to the attitude problem mentioned above. However, the site selection board could not have found any reason to remove the packages of Massachusetts and New York. Therefore, if Sematech's site selection had been made 'rationally,' the headquarters should have gone to one of the two candidates.

Indeed, a consortium in the area of computer display technology whose size and status were similar to Sematech chose San Jose driving away Austin as its headquarters' site through a nationwide site selection process in 1993 (Ladendorf, 1993). Austin offered the

5) Kim (1998) assesses the quality of university programs and the level of established industrial networks in the area of semiconductors.

consortium a similar package to the case of Sematech and the location condition of the city was improved after winning Sematech. It means that the selection of Austin might not be the best decision-making for Sematech. Then, why did Sematech choose Austin as the mecca of the US semiconductor research? The following part is devoted to explaining it.

〈Table 1〉 The Contenders' Visible Strengths and Weaknesses

State	Strengths	Weaknesses
Arizona	<ul style="list-style-type: none"> - Class 1 facility with a cleanroom - Big financial incentives: \$201 million 	Relatively weak university programs
California	<ul style="list-style-type: none"> - Excellent university system - Existing industrial network - Great cash advantage: \$134 million in direct grants 	<ul style="list-style-type: none"> - Lack of a cleanroom - Attitude problem - Poor proposal
Colorado	Good quality of places	<ul style="list-style-type: none"> - Small financial incentive - No eligible site
Florida	Good quality of places	<ul style="list-style-type: none"> - No cleanroom - Weak university program
Massachusetts	<ul style="list-style-type: none"> - Great financial package: \$441 million - Excellent facility - Proactive leadership - Existing industrial network 	- The contents of financial incentive: a loan of \$200 million
Missouri	Excellent facility	<ul style="list-style-type: none"> - Strong influence of AT&T in the candidate site - Weak university program
New Mexico	Excellent facility	<ul style="list-style-type: none"> - Weak financial package - Weak university program
New York	<ul style="list-style-type: none"> - Excellent university network - Good financial incentive: \$80 million 	N.A.
North Carolina	<ul style="list-style-type: none"> - Reputation of Research Triangle Park - The presence of Semiconductor Research Corp. - Excellent university system 	Lean financial package: \$26 million
Texas	<ul style="list-style-type: none"> - The presence of MCC - Existing industrial network - Good semiconductor-relevant research programs 	No cleanroom
Wisconsin	Good semiconductor-relevant research programs	<ul style="list-style-type: none"> - No cleanroom - Lean financial package

〈Table 2〉 Synthetic Judgement of the Contenders' Bids

	Facility/Site	Financial incentives	University programs	Industrial network	Intangible things/ etc.
Arizona	●	●	○	◐	N.A.
California	◎	●	●	●	○ (attitude problem)
Colorado	◎	◎	○	◐	● (quality of places)
Florida	◎	◎	○	◎	● (quality of places)
Massachusetts	●	●	◐	●	● (proactive leadership)
Missouri	●	○	○	◎	N.A.
New Mexico	●	◎	○	◎	N.A.
New York	◐	●	●	◐	N.A.
North Carolina	◐	◎	●	●	◐ (interim director from SRC)
Texas	◎	◐	◐	●	● (political clout)
Wisconsin	◎	◎	◐	◎	N.A.

●: excellent; ◐: good; ◎: moderate; ○: below the average.

3. Why Did Sematech Choose Austin?

1) Political clout of Texas delegation

Many observers assessed that the site selection was influenced by political consideration (Dubose, 1988; Thomson, 1988; Gibson and Roger, 1994). In particular, Texas' congressional delegation played a crucial role in inducing the consortium to Austin.

Texas has owned the most effective delegation on Capitol Hill. A congressional analyst estimated, "absolutely, without a doubt, Texas has the premier delegation in terms of clout and influence. California, with 47 legislative players compared to the 29 Texans, is in a distant second place" (quoted in Kantor, 1988: D1). He indicated that it mainly resulted from stable tenure of the Texas delegation: "... there are almost no meaningful House races in the state. That's the key, I think, to establishing a real power base on Capitol Hill" (quoted in Kantor, 1988: D1).

In political science, the mechanism is called 'machine politics.' Voters elect one politician again and again in a constituency. He or she is in the service of Capitol Hill with tenure for life. In the Congress that seniority is considered most important, he or she plays a crucial role and holds a leading position. In return for constituencies' support to him or her, he or she enthusiastically induces federal funding from Washington DC to his or her constituency. It is called 'pork barrel.'⁶⁾

Texas delegation on Capitol Hill aggressively exploited their advantages in the Sematech competition. More than 140 House members from California and East Coast states formed a coalition to eliminate Sematech from the funding bill, which would have killed it. The Texas delegation centered on J.J. Pickle, D-Austin, saved Sematech, standing against anti-Sematech coalition. Pickle, the Ways and Means Oversight Committee Chairman, marshaled support from Rep. Martin Frost, D-Dallas, on the Rules Committee, Rep. Charles Wilson, D-Lufkin and House Speaker Jim Wright in preventing a breakdown of Sematech's proposal. Besides, Texas senators, Lloyd Bentson and Phil Gramm pushed through the \$100 million of funding for Sematech. The Texas delegation completely got together and stood behind the issue as one. It was real trans-partisan unity. On the meantime, the other two states with sizable congressional delegation, California and New York did exactly the opposite (Gibson and Rogers, 1994: 493).

Sematech officials would think who could take care of the consortium persistently. An *Austin American-Statesman* reporter said in that context:

... everyone in Congress was pushing Sematech, because they thought it might be coming to their home state. But what Sematech had to worry about was, once they picked the site, who could deliver the federal money the next year and the next year and the next year (quoted in Gibson and Rogers, 1994: 493).

Finally, Sematech chose Austin not only as its headquarters, but also as its guardian. Pickle's efforts were outstanding, in supporting Sematech. He fought to get Sematech's initial appropriation of \$100 million and second year budget. He went to Rep. Wilson, Sen. Bentson, and Sen. Gramm, and said, "Now, we've got to have this" (Gibson and Rogers, 1994: 494). Not only acted he as a spokesman for Sematech but also as an advisor of it. He advised Sematech what to do. "Sematech people went in and out of my office regularly," said Pickle (quoted in Green, 1988: 1).

After all, we can identify that the incentive package offered directly by Austin was lean, but the Texas delegation tacitly guaranteed continued federal support for the consortium. Given such a condition, it is little strange for Sematech to choose Austin. Thus, the site selection can be assessed a rational and feasible choice in the viewpoint of Sematech.

However, it is also undeniable that the decision of Sematech was opposite to the concept of economic or technical rationality as a principle. The exceptional support suggested by the Texas delegation was just a promise. Therefore, the Austin package was not cash on hand for Sematech. Then, the trust in the promise was based on the past behavior of the Texas delegation. However, nobody knows about the future. Once decision is made, it is the reality that a promise appointed before is often not maintained. It is difficult to estimate that the top officials of Sematech were so naive as to have the baselessly rosy expectation.

6) Refer to Feagin (1988) about machine politics and the situation of representative politics in Texas.

Indeed, a few articles (*Austin American-Statesman*, 1992; Harlan, 1995) report that consequent fund raising of Sematech was hardly smooth after deciding the site.

2) Other advantages

Found are three other advantages for Austin in addition to the political clout. First, Austin is in the center of the country. It is accessible from the East and West coasts in about the same amount of time. It can minimize transport cost. In the same context, Sematech officials held several meetings in Dallas before choosing its headquarters. Second, Austin efficiently mobilized its strong public-private collaboration. *San Jose Mercury News* named it 'go-get-'em attitude' (Feibus and Kutzmann, 1988). The teamwork comprehended the business community, state and city governments, University of Texas and ordinary citizens. In fact, the attitude was shared by most Texans (Gibson and Rogers, 1994). Third, ironically, Austin's severely depressed real estate market looked like an incentive to Sematech (Ristelhueber, 1988: 1). It was much more affordable than the sites in the Northeast and California. It could contribute to reducing labor and operation cost.

IV. Implications of the Study

1. Implications for Austin

As a local economic effect, the consortium created 800 direct jobs and 2,400 additional related jobs. Also, the consortium attracted additional chip-related companies to Austin. However, above all, the most important thing was not such visible effects but the symbolic meaning (Gibson and Rogers, 1994). It boosted the depressed community's morale. The community acquired self-confidence that could overcome the economic crisis.

Also, it nation-widely and world-widely advertised the name of Austin as a chip industry's hub with the most prestigious semiconductor research center. Such an advertising effect has continuously played a crucial role in sustainable growth of Austin, as shown in the case of Samsung's \$1.3 billion investment in the city in 1996 (Kim, 1998).

2. Relating to the Rationality Issue

If the chief decision-maker of Sematech had been faithful to the principle of rationality, the company should have not gone to Austin but to one of Massachusetts and New York. Their packages and condition looked bigger and better than Austin's ones. But Austin won the game. The result can be interpreted in two aspects. The first is that the material and immaterial package of Austin was bigger than the one of the contenders aggregately and in the long term. However, it hears no more than *ex post facto* rationalization to the decision.

Rather, valid looks assessment that the consideration to political feasibility plays the

critical role in the site selection. In that competition, Austin relatively less satisfied most location determinants than the contenders did. It is difficult to find any basis 'rationally' explaining how Austin won the headquarters. In addition, there was no clear evidence to explain the reason why Sematech chose Austin. Sematech declined to discuss the comparative merits of the proposals suggested. The head of site selection committee just said, "Texas had the most solid proposal across board, in all areas of our criteria" (Walsh, 1988). However, no basis was presented to support the assertion. What several contenders did not yield to the final decision resulted from this (Tyson, 1988). After all, through the Sematech case, we can identify that a decision, particularly site selection, is not always made 'rationally' but strongly affected by political consideration. Even if the rationality of the decision is appreciated, we cannot deny, through the case, that decision-making is a value-judgment process weighting a few of several consideration factors. There exists no value-free decision-making from the first.

3. Relating to Site Selection

First of all, the factors considered important in the neoclassical approach were scarcely deliberated as determinants in the actual site selection. It is to verify an idea that the neoclassical approach does not stand on concrete reality. Recently, site selection is rarely determined by neoclassical factors but by the combination of factors such as quality of research universities, amenities and livability, business climate and incentive package. The alienation from the reality of the neoclassical approach reflects the crisis of classical rationality in decision-making.

The second is that most contenders offered cash incentives. Also, the incentives were considered important by the site selection committee. It is to verify that the cash incentive is required and effective in inducing corporations despite some negative thought spread in academia.

Lastly, this study implies that building strong research programs is long-term and sound investment to induce foot-loose capital while offering cash incentives is a short-term strategy to attract business. Moreover, maintaining induced business also highly depends on the competence of the programs. Indeed, most the competent candidates in the Sematech race had strong engineering programs in the field of semiconductor.

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