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University-industry collaboration (UIC) has been considered as an important factor in driving industrial innovation and the welfare of a country. Both universities and firms can benefit from UIC, such as through improved innovation performance. On the university side, government has always played a dominant role in resource funding that has driven universities to transfer and commercialize academic outcomes to industries. Although the government is still a primary source for university funding, patterns of funding are changing. For example, in Australia, Canada, the United Kingdom, the United States (U.S.), and China, governmental funding is allocated on the basis of university performance and industrial funding is mission-oriented and contract-based. Furthermore, university research funded by private companies is increasing among the countries in the Organization for Economic Co-operation and Development (OECD).

This study used organizational control theory as the theoretical lens to explicate the previously mentioned relationship. In discussing organizational control theory in the UIC context, three control mechanisms were proposed and examined, namely the UIC management mechanism, UIC regulation implementation, and innovation climate of the university.

Two datasets were combined in this study. First, we used a questionnaire to collect data for the UIC management mechanism, UIC regulation implementation, and the innovation climate. A total of 163 universities were identified from the Ministry of Education Directory of Higher Education Institutions in 2011. From the 163 directors surveyed, 146 complete and useable questionnaires were returned (response rate = 89.6%). Of the 146 universities rated, 49 were public and 97 were private. Second, this study used the UIC database to extract data on the governmental funding, industrial funding, and innovation performance of the 146 universities from 2008 to 2011. The average amount of governmental funding for UIC was US\$6,327,827. In general, the average amount of governmental funding for UIC infrastructure was US\$671,740, and the average amount of governmental funding for research projects was US\$19,914,384. Regarding industrial funding, the average amount for UIC was US\$3,224,250 and that for UIC infrastructure was US\$268,187.

Table 1. Descriptive statistics for different funding sources and innovation performance.

| Indicator | Mean | Std. dev. | Min | Max |
|-----------------------------------------------------------------------------------------|------------|---------------|--------|--------------|
| <i>Governmental funding</i> | | | | |
| The amount of governmental funding for UIC | 6,327,827 | 565,348,256 | 0.0 | 147,641,009 |
| The amount of governmental funding for UIC infrastructure | 671,740 | 40,943,753 | 0.0 | 9,323,566.75 |
| The amount of governmental funding for research projects | 19,914,384 | 1,751,418,032 | 5000.0 | 522,990,425 |
| <i>Industrial funding</i> | | | | |
| The amount of industrial funding for UIC | 3,224,250 | 179,829,763 | 0.0 | 38,960,188.9 |
| The amount of industrial funding for UIC infrastructure | 268,187 | 45,546,172 | 0.0 | 15,507,390 |
| <i>Innovation performance</i> | | | | |
| The number of licensing patents (exploitation rights granted by licensors to licensees) | 4.88 | 16.00 | 0.0 | 118 |
| The number of issued patents in Taiwan, the United States, or other countries | 30.57 | 65.15359 | 0 | 403 |
| The amount of intellectual property-derived income | 498,342 | 51,825,777 | 0.0 | 13,420,366 |
| The number of business stationed in the incubation centre | 5.66 | 6.31 | 0.0 | 40 |

Source: UIC database 2008–2011.

We tested the hypotheses using the PLS-SEM approach. The findings from the tested hypotheses were as follows. First, governmental funding positively affected UIC management mechanism and UIC regulation implementation but did not significantly affect the innovation climate. Thus, H1 and H4 were supported but H7 was rejected. Second, industrial funding positively affected UIC management mechanism, UIC regulation implementation, and innovation climate. The results thus supported H2, H5, and H8. Third, both UIC management mechanism and UIC regulation implementation positively affected innovation performance but innovation climate did not significantly affect innovation performance. Therefore, H3 and H6 were supported but H9 was rejected. Finally, these results revealed that both government and industry facilitated UIC management mechanism and UIC regulation implementation, which in turn influenced university innovation performance.

Table 3. PLS results tested hypotheses.

| Hypothesis | β | t-value | Results |
|------------------------------------------------------------|---------|---------|-----------|
| H1: Governmental funding → UIC management mechanism | 0.27 | 3.32*** | Supported |
| H2: Industrial funding → UIC management mechanism | 0.46 | 6.22*** | Supported |
| H3: UIC management mechanism → Innovation performance | 0.49 | 6.92*** | Supported |
| H4: Governmental funding → UIC regulation implementation | 0.42 | 5.49*** | Supported |
| H5: Industrial funding → UIC regulation implementation | 0.22 | 2.03* | Supported |
| H6: UIC regulation implementation → Innovation performance | 0.32 | 3.95*** | Supported |
| H7: Governmental funding → Innovation climate | 0.08 | 1.10 | Rejected |
| H8: Industrial funding → Innovation climate | 0.31 | 4.16*** | Supported |
| H9: Innovation climate → Innovation performance | 0.02 | 0.72 | Rejected |

Note: UIC = university-industry collaboration; UIC management mechanism $R^2 = 0.48$; UIC regulation implementation $R^2 = 0.37$; Innovation Climate $R^2 = 0.15$; Innovation performance $R^2 = 0.53$.

* $p < .05$, ** $p < .01$, *** $p < .001$.

According to the research result, it implies that universities should strategically choose funding sources. If a university's purpose is to make the organizational structure more flexible, we suggest seeking more government funding; in contrast, if the university's purpose is to create a favorable environment that supports UIC activities, we suggest pursuit of funding from industries. A university is more likely to become an entrepreneurial university through frequent interaction with industries.

