Preferences on Mechanisms to Stimulate Academia-Industry Linkage in Rwanda: A perspective from Academic Staff

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Abstract

Academia-Industry Linkage (AIL) has received much attention in practice and research. As for now, the innovation of a business is based on commercialization of academic knowledge stimulated by setting mechanisms enhancing AIL. Even though, research has devoted considerable efforts in determining the mechanisms of AIL success, much less is known about AIL. Also, universities and related tertiary educational institutions have become the pillars of many countries' development especially developed countries. This is based on exploitation and application of knowledge acquired in order to solve existing problems within the industries. Besides, the underdeveloped and developing countries are not streamlining even not aware of the role that can be played by universities for the economies of their countries. Meanwhile, the industry-based orientation is the backbone of sustainable development of the country through economic transformation. Also, the international experience has shown that the economic development is impossible without a well-functioning industry sector. Thus, a research project exploring mechanisms to stimulate AIL is of great impact for the national development. The current survey is focusing on information related to mechanisms to stimulate AIL by INES academic staff. Herein, an extensive analysis of responses from questionnaires will be performed in order to evaluate the mechanisms that influence the success of AIL. Alternatively, a novel conceptual model which synthesizes our results will be proposed in order to synergize the influencing mechanisms and their relationships within the linkage process.

Key words: Academia, Industry, Linkage, Mechanisms, University

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1. Introduction

Linkages between industries or companies and academia have an increasingly important issue for some years ago and researchers have devoted considerable efforts to find the mechanisms that lead to the success of such mechanisms (Hillebrand and Biemans, 2003). A nearly form of linkage with different mechanisms is one between universities and industry in the so called "University-Industry Linkage or Academia-Industry Linkage". This form of linkage has different objectives and faces different constraints. Few literatures on this approach have been produced but do not necessarily carry out deep analyses by taking into considerations region by region or country by country. Many countries especially developed ones have adopted AILs as alternative way in achieving economic development towards knowledge-based transfer and exploitation and universities are playing a tremendous role in sustaining these partnerships (Ankrah and AL-Tabbaa, 2015). This is only possible when industries have the mechanisms well designed and their implementations well followed and monitored. Herein, the universities and research institutions are key components of National Innovation Systems (NIS) where activities and interactions initiate, modify and diffuse new technologies (Ankrah and AL-Tabbaa, 2015). In this regard, policymakers from both university and industry may stand on shared needs rather than existing traditional partnerships. For instance, through continuing education programs elaboration and amendment, hands-on skills towards science parks, technologies transfer and incubation centers, etc leading to the commercialization of academic knowledge. Moreover, the role played by university in facilitating the conditions of innovation is also explained by triple-helix model where industry-university-government relations must be interconnected. The said model explains that the university needs to be directly linked to industry in order to maximize the industrialization of knowledge for serving the economic development aside of teaching-learning process and research (Boo-Young E, Keun L, 2010). Lots of positive impacts may result in AILs enhancement: On one hand, industries or companies may gain highly qualified human resources both students and researchers with adapted working environment and affordable labor cost (Myoken, 2013); companies may access to the technology and knowledge (Barnes et al., 2002); companies may use expensive research infrastructure of universities (Bekkers and Bodas Freitas, 2008). On the other hand, universities may benefit to the funding provided by industries or companies as the latter must allocate a certain budget for research and development (R&D). Herein, many companies put some percentages from their initial capital for product development and innovation and this is

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coming from partnership with universities and their inner R&D (Bekkers and Bodas Freitas, 2008). Also, the universities may access to the equipment of companies and patenting their ideas through partnerships. Subsequent studies have been investigated and shown that the linkage with industry is inevitable for university acknowledgment together with national and international recognition. Moreover, numbers of researches related to AILs are increasing year by year, but no systematic study has been done related to the success of AILs towards mechanisms by individual universities and companies in certain countries especially in peripheral regions or developing countries as case studies. For example, most studies focus on investigation on how academic works differ to commercialization of products by taking into consideration of exploitation of invented patents, also some studies focus on success factors due to market orientation, while other studies focus on organizational forms, motivations for AILs and operationalization (Perkmann et al., 2013; Schofield's, 2013). Therefore, there is a need to link all statements with evidenced study investigations for a particular case study. To solve this, our study will aim at exploring the mechanisms to stimulate the AIL. Also, a model for organizing relevant and success mechanisms will be established and from the model, we will provide practical recommendations and suggestion for future plans.

2. Research questions

During this study, the research questions can be formulated as follows:

- How do academic staff value the different strategic mechanisms to stimulate effective academia-industry linkage?

- What are the staff preferences regarding the major scenarios of stimulating the academia-industry linkage?

- How do academic staff value the existing mechanisms to stimulate their commitment towards academia-industry linkage?

3. Literature review

According to Alexander et al (2012), success is a subjective term opposite to the performance (Alexander et al, 2012). Also, the success lies in the complexity of combining partners that are fundamentally different as universities and industry partners are (Thune, 2011). The partnership is heterogenous setting where partners have different activities and objectives which make it likely that

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they have different perceptions of success. Thus, there exist two types of success named subjective and objective success. Hence, the factors that contribute to both or any of these objectives are called success factors. The important factors of university-industry linkage are contextual, organizational and process factors. In the contextual factors, there is a need to choose right and potential partners in order to achieve objectives of a certain project. Also, the partner needs to be open and flexible in order to share knowledge and information and partnership to work (Thune, 2011). With the previous experience of partners, the university can benefit more if the partners are stable and have the will to complement on the project to collaborate (Barnes et al, 2006). For this, it is very important to understand partners objectives and perceptions, but those objectives and perceptions must not necessarily to be the same (Spekman, 1996). After preliminary stage of contextual factors, there are organizational factors aiming at deciding the level of formalization of the project and to set up agreement for the partners, enhancing commitment among partners, and substantiate that there are resources and skills for the collaboration. Hence, the people and facilities are needed in order to enter in collaboration (Bender et al, 2015). It has been proven that a flexible approach towards contractual discussions is very important in order to sustain the collaboration. It is in the same way that the focus on practicalities to be occurred is very important than the focus on agreement either verbal or written (Burnside et al, 2008). In order to achieve the target of organizational factors, the process factors are of great significance, that is to have the manager and management team with potential skills to communicate efficiently and to build the relationship and trust among the partners. With the communication, the so-called face to face meetings are so important as they can minimize the misunderstandings between the partners. It is advised to not overdo it as too much communication can make the partners losing interest in any project development in future (Chen et al, 2012). Besides, the relationships in partnerships should be monitored and built over time. When being engaged in long term partnerships, trust is very important and mutual collaborations through visits, discussions and meetings must be encouraged (Pertuze et al, 2010). Therefore, the informal relationships can contribute to the formal ones (Grimpe C, & Hussinger K., 2013). The manager may play a big role in bringing the project of his/her previous experience on similar situations so that the collaboration with certain organizations will be tremendous. With this knowledge, it is very easy to notice and bridge the gaps between university and industry (Lee, K-J et al, 2010). Additionally, another factor called knowledge transferee is very important and must be continuously proceeding via collaboration. Here,

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the mutual understandings between university and industry make sharing of knowledge and skills very easier and any of both willing to learn, can learn from another (Lakpetch et al, 2012).

Since the 1980's, the literature on academia industry collaboration has been treating different subjects related to the framework (Leydesdorff et al., 2013; Etzkowitz, 2003), and collaboration mechanisms. Nsanzumuhire & Groot (2020) grouped the literature on AIL in three major themes: trust building mechanisms, boundary spanning mechanisms and AIL implementation mechanisms. In this section we follow the same framework to discuss the mechanisms through which AIL is activated.

i. Trust building mechanisms

The literature distinguishes mainly three mechanisms through which companies and academia build trust: using existing relationships to strengthen trust, building trust using intermediaries such as Technology Transfer Offices, AIL focal person appointed by a Higher Learning Institution (HLI). Such intermediaries will make use of contractual safeguards and enforcing policies such as Intellectual Property policy. The third mechanism of building trust is through networking i.e. working together, openness and putting oneself at risk from others, discussing issues democratically, gaining understanding about other disciplines, having clear and complementary roles and socializing.

ii. Boundary Spanning mechanism

For academia and industry to interact effectively, there is need to span the institutional, cultural and operational boundaries. Different boundary spanning structure have been proposed in the literature. Some of those boundaries spanning structure found in the literature include appointment of AIL champion at HLI level (Champenois & Etzkowitz, 2017), creation of a specialized organization such as Technology Transfer Offices (TTOs), University Incubators (UIs), Collaborative Research Centres (CRCs) or a Hybrid autonomous organization ("HAOs") (Villani et al., 2017). For these structures to smoothen the boundaries between the partners, they will proceed by aligning the needs, capabilities, and attitudes of parties (Chau *et al.*, 2017), putting in place flexibility especially with regard to the bureaucracy, or creating a boundary space (Champenois & Etzkowitz, 2017). They may also pass by creation of communities of practices (CoPs) (Theodorakopoulos *et al.* (2012).

iii. AIL implementation mechanisms

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Mechanisms of AIL implementation are categorized into mechanisms of educational collaboration, mechanisms of academic entrepreneurship and mechanisms of research collaboration. Through educational collaboration, involved companies and HLIs will use students projects, guest lectures, field visits and other channels to generate and share knowledge between them through a three step process consisting in (1) sharing knowledge, (2) joint sense-making and (3) integrating knowledge (Kunttu, 2017). Research related collaboration will take place through joint R&D projects which are implemented through mechanisms such as project initiation (identifying research idea, negotiate and sign MoU, writing proposals and raise funds), R&D project management by building momentum, building trust, developing simple mechanisms for rapid information exchange, establishing clear roles in the teams and ensure understanding of each other's terminology (Canhoto et al., 2016; Morandi, 2011).

4. Methodology

The aim of this study was to understand the academic staff preferences for mechanisms to stimulate academia industry collaboration. For this a cross-sectional survey was used using a unique data collected from permanent academic staff of the "Institut d'Enseignement Supérieur de Ruhengeri" INES-Ruhengeri. Data were collected using a self-administered online questionnaire. The study was conducted for the period of five months (From January to May 2021). To collect data on the preference of respondents, the questionnaire was designed using discrete choice experiment (DCE) theory (Nsanzumuhire et al., 2021). The DCE is a methodology using the utility maximization theory and rationality to determine the respondents' preference. DCE focuses on attributes as determinants of utility (Lancaster, 1966) therefore allowing both quantitative and qualitative utility to be assessed using DCE methodology. According to Ryan et al. (2008), DCE theory assumes that the latent utility for an alternative in any given choice set can be expressed by:

$$U_{in} = V(X_{in}, \beta) + \varepsilon_{in}$$

The key assumption is that the individual n will choose alternative i if and only if that alternative maximizes their utility amongst all J alternatives included in the choice set Cn. That is:

$$y_{in} = f(U_{in}) = \begin{cases} 1 \text{ if } U_{in} = \max_{j} \{U_{ij}\} \\ 0 \quad \text{otherwise} \end{cases} \quad \forall j \neq i \in C_n$$

Where yin is a choice indicator equal to 1 if alternative i is chosen, and 0 otherwise.

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4.1 Set up of the discrete choice experiment questionnaire

In designing the discrete choice experiment questionnaire, three attributes (mechanisms to stimulate company commitment, mechanisms for UIC governance or boundary spanning and trust building mechanisms) were used. These attributes were identified as being the major aspects of UIC stimulating mechanism. The identification of these attributes as well as their levels was done following an iterative process (Shanahan et al., 2019; Ryan et al., 2012) by combining the literature review on UIC processes and results from focus group interviews conducted with participants from 26 agro-processing companies (Nsanzumuhire et al., 2021). Each attribute had three levels as indicated in the table 2.

Table 1: attributes and attributes levels

Stimulating company commitment	Mechanisms for UIC governance	Mechanisms for trust building
Through setting clear UIC policies and regulations	A Government controlled innovation organizer	By using explicit contracts
Through provision of financial incentives	Internalized governance	By working together
Through training and sensitization	Externalized governance by creating an independent company	Through quality of graduates and researchers

From the attributes and attributes levels, 16 choice sets were generated using orthogonal design from SPSS software. In the questionnaire choice sets were randomly presented to the respondents in pairs as two scenarios of UIC stimulating mechanisms. In total eight pairs of the choice sets were formed and for each proposed pair, respondents had to choose one scenario which seem more effective than the other. Since the questionnaire was online, the force response option was set to ensure that respondents make a choice for every choice set presented. Appendix A presents the 16 choice sets as presented in the questionnaire.

4.2 Data analysis

Data were analyzed using both descriptive statistics and regression. Regarding the regression, data on value put by respondents on different mechanisms to stimulate collaboration were analyzed using ordered logit regressions while data collected using DCE were analyzed using the random effects logistic regressions. In the letter, the respondents' choice was considered as the outcome variable.

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Explanatory variables were the different attributes levels with three of them i.e., stimulating commitment through setting clear UIC policies and regulations, externalized governance by creating an independent company and building trust through working together being taken as a reference. Following the recommendation by Brambor et al. (2006), the regression used also interaction variables. The regression results indicated in the next section were obtained by performing a backward stepwise regression.

5. Results

In this section we first present results from descriptive statistics, then we present results from regressions.

5.1. Description of the sample

Statistics in the table 2 indicate that most respondents are male (approx. 65%), over 35 years old (approx. 61%), with an experience of less than 10 years (75%). Regarding their qualification, a majority of respondents hold a Master's degree (41%), followed by PhD (33%) and Bachelor's degree (20%).

Table 2: Proportion estimation

Characteristics of respondents	Variants	Proportion	Std. Err.	[95%_Conf	Interval]
Gender	Male	0.653	0.057	0.534	0.756
	Female	0.347	0.057	0.244	0.466
Age	Young	0.389	0.058	0.281	0.508
	Old	0.611	0.058	0.492	0.719
Experience	Less experienced	.75	0.051	0.635	0.838
	Highly experienced	.25	0.051	0.162	0.365
Qualification	Bachelors	0.208	0.048	0.128	0.320
	Masters	0.417	0.059	0.307	0.536
	PhD	0.333	0.056	0.232	0.452
	Others	0.042	0.024	0.013	0.124

5.2. Value of mechanisms to stimulate collaboration

5.2.1. Value put by respondents on AIL stimulating mechanisms

As warm up question for the discrete choice experiment questions, respondents were asked to indicate how important each of the attributes' levels appear to them. As it can be noted from the table 3, apart from the externalized governance and stimulating commitment through training and sensitization, all other mechanisms are found very important by most respondents. Regarding mechanisms to stimulate commitment of universities to engage with industry, the first mechanism found by many respondents as very important was providing financial incentives to companies, followed by setting clear policies.

For the mechanisms related to governance of AIL, internalized governance (i.e., creating an office at the university level in charge of collaboration) was found by many respondents as very important, although the proportion was lower compared to mechanisms in other categories. Trust building through enhancement of quality of education and research was viewed by a large majority of respondents (83%).

Table 4: Value put by respondents on AIL stimulating mechanisms

Category	Stimulating mechanisms	Level of importance	Proportion	Std.Err.	[95%_Conf	Interval]
Mechanisms to stimulate commitment to engage with industry	Fina_incentives	Very important	0.694	0.055	0.576	0.792
		Moderately important	0.222	0.049	0.139	0.335
		Not important at all	0.083	0.033	0.037	0.176
	Training_sensitizing	Very important	0.361	0.057	0.257	0.481
		Moderately important	0.389	0.058	0.281	0.508
		Not valuable at all	0.25	0.051	0.162	0.365
	Set_policies	Very important	0.639	0.057	0.519	0.743
		Moderately important	0.278	0.053	0.185	0.395
		Not important at all	0.083	0.033	0.037	0.176
Governance of academia-industry linkage activities	Internalized_governance	Very important	0.556	0.059	0.437	0.668
		Moderately important	0.333	0.056	0.232	0.452
		Not important at all	0.111	0.037	0.056	0.21
	Externalized_governance	Very important	0.389	0.058	0.281	0.508
		Moderately important	0.472	0.059	0.358	0.59
		Not important at all	0.139	0.041	0.075	0.242
	Centralized_governance	Very important	0.458	0.059	0.345	0.576
		Moderately important	0.444	0.059	0.332	0.563
		Not important at all	0.097	0.035	0.046	0.193
Mechanisms for trust building	Trust_contracts	Very important	0.806	0.047	0.695	0.883
		Moderately important	0.167	0.044	0.096	0.274
		Not important at all	0.028	0.02	0.007	0.108
	Trust_Working together	Very important	0.778	0.049	0.665	0.861
		Moderately important	0.167	0.044	0.096	0.274
		Not important at all	0.056	0.027	0.021	0.142
	Trust_Quality	Very important	0.833	0.044	0.726	0.904

		Moderately important	0.111	0.037	0.056	0.21
		Not important all	0.056	0.027	0.021	0.142

5.2.2.   Value put by respondents on proposed strategies to stimulate researchers' commitment

Results indicate that communication and transparency is found by respondents as the most important strategy to stimulate their commitment to collaboration activities (with 83% of respondents finding it very important), followed by supporting leadership and aligning the workload to the AIL requirements (with 71% and 69% respectively).

Strategies to stimulate commitment of researchers	Level of importance	Proportion	Std.Err.	[95%_Conf	Interval]
Provide performance rewards	Very important	0.625	0.057	0.506	0.731
	Moderately important	0.306	0.055	0.208	0.424
	Not important at all	0.069	0.03	0.029	0.159
Aligning workload to AIL requirements	Very important	0.694	0.055	0.576	0.792
	Moderately important	0.292	0.054	0.197	0.409
	Not important at all	0.014	0.014	0.002	0.096
Communication & transparency	Very important	0.833	0.044	0.726	0.904
	Moderately important	0.167	0.044	0.096	0.274
Supporting leadership	Very important	0.708	0.054	0.591	0.803
	Moderately important	0.222	0.049	0.139	0.335
	Not important at all	0.069	0.03	0.029	0.159
Organizing competition	Very important	0.667	0.056	0.548	0.768
	Moderately important	0.208	0.048	0.128	0.32
	Not important at all	0.125	0.039	0.065	0.226
Provide facilitation	Very important	0.639	0.057	0.519	0.743
	Moderately important	0.236	0.05	0.15	0.35
	Not at all important	0.125	0.039	0.065	0.226

5.3.   Results from the discrete choice experiment

To analyze the preferences of respondents, we performed a random effect logistic regression with interaction effects of gender, age, experience and qualification. To select the three attributes' levels to consider as pivot in the regression, we identified those levels appearing the most in the choices selected by respondents. Appendix B indicates that those levels are ensuring commitment through clear policies and regulations, governance of AIL using externalized governance and building trust by working together. Results from regression indicate that out of these three attributes level which can be characterized as the most preferred mechanisms of stimulating collaboration, governance of AIL

through internalized mode (office at University or appointment of a focal person) and stimulating commitment through training and sensitization are significant. The coefficients of the two variables are positive for the former and negative for the latter; this means that internalized governance affect positively the choice (i.e., considered as effective in stimulating collaboration) while training and sensitization has a negative effect (i.e., considered to be ineffective). Several interaction effects are found significant in this regression results. Interaction between gender and contracts, gender and government-controlled governance, gender and internalized governance, experience and training, experience and contract, experience and internalized governance as well as experience and incentives. Interaction between gender and contracts, between experience and training, between age and incentives, as well as between experience and contract have positive coefficients. This means that male respondents prefer building trust by establishing contracts more than female, while the higher the experience the more a respondent finds stimulating commitment through training and sensitization and building trust through contracts to be effective mechanisms to foster interactions with industry. Furthermore, the positive coefficient of age and incentives mean that older people find provision of incentives to companies to be an effective strategy to stimulate commitment. Considering the interaction effects with negative coefficients, we can state that female respondents prefer more government-controlled governance and internalized governance than male. Similarly, the higher the experience of a respondent, the les he/she prefers internalized governance and stimulating commitment through financial incentives.

Regression results

Respo_Choice	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Gender_Contracts	.173	.073	2.36	.018	.029	.316	**
Gender_govecontrol	-.205	.079	-2.59	.01	-.36	-.05	***
Gender_interngov	-.147	.073	-2.00	.046	-.291	-.003	**
Gender_Wrktog	.094	.07	1.33	.183	-.044	.231	
Gender_incentives	.028	.061	0.47	.64	-.09	.147	
Experience_training	.031	.009	3.29	.001	.013	.05	***
Experience_contract	.012	.006	1.95	.052	0	.024	*
Experience_quality	-.003	.008	-0.38	.703	-.019	.013	
Experience_interngov	-.02	.01	-2.09	.036	-.039	-.001	**
Experience_incentives	-.012	.007	-1.87	.061	-.025	.001	*
qualification_training	.042	.05	0.84	.401	-.056	.139	
qualification_contract	-.034	.04	-0.86	.387	-.112	.043	
qualification_quality	-.023	.042	-0.54	.589	-.104	.059	
qualification_govcontrol	.032	.038	0.84	.402	-.043	.107	
Trainings	-.209	.122	-1.72	.086	-.447	.029	*
Incentives	-.08	.06	-1.32	.186	-.198	.039	
contracts	-.076	.111	-0.68	.494	-.293	.141	

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quality	-.019	.111	-0.17	.861	-.237	.199	
govcontrol	-.024	.105	-0.23	.818	-.23	.182	
interngov	.253	.082	3.07	.002	.092	.415	***
age_Incentives	.094	.053	1.76	.078	-.011	.198	*
age_interngov	-.072	.071	-1.01	.311	-.21	.067	
Constant	.541	.046	11.84	0	.452	.631	***

Mean dependent var	0.500	SD dependent var	0.500
Overall r-squared	0.062	Number of obs	1152.000
Chi-square	75.050	Prob > chi2	0.000
R-squared within	0.000	R-squared between	0.000

*** p<.01, ** p<.05, * p<.1*

6. Discussion of findings

The aim of this study was to understand the academic staff preferences for mechanisms to stimulate academia industry collaboration. Results indicate that concerning the value put by respondents on mechanisms to stimulate academia industry linkages, respondents judged all mechanisms important except (1) stimulating commitment through training and sensitization and (2) governance through externalized governance by creating a company. It is worth noting that the same questionnaire was previously administered to company representatives (Nsanzumuhire et al, 2021) and results also indicated low preference of stimulating commitment through training and sensitization but in higher proportions than in this case of academic staff. Such a low preference for training and sensitization may appear surprising by considering the fact that to (Ssebuwufu et al, 2012), lack of capacity, especially lack of research capacity and entrepreneurial skills may constitute the main factors leading to low academia industry interaction in Sub-Saharan Africa. But this low preference for training and sensitization may be caused by the fact that academic staff perceive other possible reasons for the lack of commitment, other than the lack of capacity or the lack of information about the usefulness of AIL. The results from companies showed also a high preference for externalized governance contrary to academic staff whose most preferred form of governance is internalized governance. This divergence can be associated to the fact that HLIs are more structured and bureaucratic than companies which leads them to feel an internalized structure as effective (Fischer et al., 2019).

An overwhelming majority of respondents indicated that trust between academia and industry can effectively be built through enhancing quality of graduates and of research conducted. This is most probably stemming from the recognition by respondents of the existence of a mismatch between what students learn at school and the skills needed by industry (Ssebuwufu et al, 2012). The high

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preference of quality of research was proposed by Bonaccorsi (2016) as a precondition for HLIs to effectively contribute to regional development and the same argument was used by Nsanzumuhire et al. (2021) to justify the low level of collaboration in Rwanda. Furthermore, the preference of enhancing quality of graduates as an effective mechanism for building trust is an indication that effectiveness of education system and effectiveness of AIL are strongly entangled in such a way that in low income countries they constitute a vicious circle (Nsanzumuhire & Groot, 2020).

Respondents were also asked to indicate how important are the proposed strategies to stimulate their commitment into AIL activities. Respondents indicated at a high proportion that communication and transparency constitute the most effective mechanism. This may be interpreted as an indication of trust issue between academic staff and the company. This trust issue was also found by Nsanzumuhire et al. (2021) in their study of barriers to AIL in Rwanda. It can also be argued that this high preference for communication and transparency stems from the already reported poor support to AIL at institutional level (Tsubouchi et al., 2008; Smirnova, 2014; Zavale & Macamo, 2016; Vega-Jurado et al., 2007; Ryan et al., 2008; Muscio & Pozzali, 2012).

Different interaction effects were used to better understand the choices of respondents for an effective set of strategies to stimulate interactions between academia and industry. Results indicate for instance that less experienced staff prefer more the provision of incentives as a mechanism of instilling commitment than their highly experienced counterparts. To explain this result, we can go back to the theories of motivation especially the needs theory of Abraham Maslow (1943). Indeed, it can be argued that less experienced staff are still striving to satisfy their basic needs, therefore being motivated more by the material incentives while highly experienced academic staff have moved to the upper level more psychological needs and hence being motivated by obtaining self-satisfaction and prestige.

7. Conclusion

In this paper, we analyze the responses provided by the academic staff towards their preferences on mechanisms that stimulate the academia-industry linkage in Rwanda. It is worthy nothing that many respondents demonstrated that the provision of financial incentives and setting clear polices are the best mechanisms to stimulate the commitment of industry to engage with industry. Also, the internalized governance instigated by the creation of an office at the university level in charge of

collaboration was very important when considering the mechanisms related to governance of AIL. Alternatively, many respondents agreed with the trust building through enhancement of quality of education. Moreover, the externalized governance and stimulating commitment through training and sensitization are found to be less important considering the engagement of university in collaboration with industry.

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Appendix A: choice sets used in discrete choice experiment

#	Scenario as presented in the questionnaire	Stimulating company commitment	Mechanisms for UIC governance	Mechanisms for trust building
	Scenario A	Setting clear AIC policies and regulations	Government controlled	Through explicit contracts
	Scenario B	Provision of financial incentives	Specialized office or focal person	Through explicit contracts
	Scenario A	Through training and sensitizing	Specialized office or focal person	By working together
	Scenario B	Provision of financial incentives	Independent company	Through quality of graduates and researchers
	Scenario A	Provision of financial incentives	Government controlled	By working together
	Scenario B	Setting clear AIC policies and regulations	Government controlled	Through explicit contracts
	Scenario A	Provision of financial incentives	Government controlled	By working together
	Scenario B	Setting clear AIC policies and regulations	Independent company	By working together
	Scenario A	Setting clear AIC policies and regulations	Independent company	By working together
	Scenario B	Provision of financial incentives	Government controlled	By working together
	Scenario A	Through training and sensitizing	Independent company	Through explicit contracts
	Scenario B	Setting clear AIC policies and regulations	Specialized office or focal person	Through quality of graduates and researchers
	Scenario A	Through training and sensitizing	Specialized office or focal person	By working together
	Scenario B	Provision of financial incentives	Independent company	Through quality of graduates and researchers
	Scenario A	Provision of financial incentives	Independent company	Through explicit contracts

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Scenario B	Setting clear AIC policies and regulations	Government controlled	Through explicit contracts

Appendix B:

	Respondent choice	Clear_policies			
		0	1	Total	
	No	370	206	576	
Tabulation of Respo_Choice Clear_policies	Yes	350	226	576	39.24
	Total	720	432	1152	
	Respondent choice	Trainings			
		0	1	Total	
Tabulation of Respo_Choice Trainings	No	495	81	576	
	Yes	441	135	576	23.44
	Total	936	216	1152	
	Respondent choice	contracts			
		0	1	Total	
Tabulation of Respo_Choice contracts	No	362	214	576	
	Yes	358	218	576	37.85
	Total	720	432	1152	
	Respondent choice	quality			
		0	1	Total	
	No	415	161	576	
Tabulation of Respo_Choice quality	Yes	450	126	576	21.88
	Total	865	287	1152	
	Respondent choice	govcontrol			
		0	1	Total	
	No	352	224	576	
Tabulation of Respo_Choice govcontrol	Yes	368	208	576	36.11
	Total	720	432	1152	
	Respondent choice	extgovern			
		0	1	Total	
	No	354	222	576	
Tabulation of Respo_Choice extgovern	Yes	366	210	576	36.46
	Total	720	432	1152	
	Respondent choice	interngov			
		0	1	Total	
Tabulation of Respo_Choice interngov	No	446	130	576	

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	Yes	418	158	576	27.43
	Total	864	288	1152	
	Respondent choice	Working_together			
		0	1	Total	
Tabulation of Respo_Choice Working_together	No	375	201	576	
	Yes	344	232	576	40.28
	Total	719	433	1152	
	Respondent choice	Incentives			
		0	1	Total	
Tabulation of Respo_Choice Incentives	No	287	289	576	
	Yes	361	215	576	37.33
	Total	648	504	1152	