Effect of Past Synergy on Present Organizational Performance – Evidence from Educational Sector – A short report

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Abstract

The paper proposes that past collaborative work amongst academicians positively influences their present performances on two grounds. They perform well in their fields of research and development in the future and they tend to be more effective in imparting knowledge to the students who fare better in subjective evaluations having the same background and academic records. The paper presents a proposed model to evaluate the same.

Keywords: *Collaborative performance, synergy, Education*

Introduction

Organizations adopt team work either for better and faster production or for synergistic effect derived from multiple expertise (Deloitte 2016). The issue is well proven but a direct connect to economic productivity is still unclear. A technical study was carried out to find individual contributions in a team; where such figurative values are not directly present. CoScore was calculated by solving a fixed point problem, with emphasis on endogenous human contributions (Szwagrzak & Treibich 2020). But the study did not narrow down to human capital. Mergers and joint ventures have proved to be significant over decades. Recently, three major sources of synergistic efficiency were empirically identified (see Feldman & Hermandez 2021): Relation-based, Network-based and Market-based. But the impact of such synergies is heavily dependent on whether people are aware of the motive behind the collaboration or not (Slusky & Caves 1991). There are three aspects of teamwork and team performance that were studied in general over a vast gamut of literatures. One of them is moral/sentimental hazard (Chan 2016), the other is non-collaboration, which can be termed as peer pressure (Kandel & Lazear 1992; Mas & Moretti 2009). Both these aspects and the researches over them were meant to outline negative impacts. The third aspect dealt with positive impact on performance - incentive. Team incentive was shown to promote team efficiency in general and team agents in specific (Bandiera, Barankey & Rasul 2013).

The current study however, will take these researches as assumed and move further to proving whether past collaborations influence the present efficiency or not. All prior studies have focused only on the factors governing team performance, where the stimulating factor was in

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the present time period. There is a limited economic study with micro-economic agents to find how much such collaborations benefit individuals over time. The importance of the study lies in the fact that collaboration at time ti-j (where i = current time period and j = i – 1,2 … n) between two economic agents continue to provide increased efficiency in the time period ti. The main motivation of this study stems from the fact that the culmination and transfer of knowledge and expertise that happened sometime in the past, should not go away with time.

For instance, in a study conducted by Doyle et al. 2015, over the health care sector found that past collaborative efforts of doctors that accumulated for about 1σ increase in expenditure, reduced the mortality rate by approximately ten percent over a year. Under emergency treatments, patients recover and respond faster because of the efficiency in treatment leading from past amalgamation of expertise (Silver 2021). The paper cites this study because; Health Care industry has undergone a huge paradigm shift because of the increased complexities of diseases requiring multiple expertises. It improves strategic decisions, exchange of competencies and improves multilevel outcomes (Rosen et al. 2018).

This study shifts focus to education sector that is also undergoing a paradigm shift because of the necessity of multiple expertise in R&D as well as the teaching learning process especially in higher education. The challenges faced in collaborative or teamwork in education sector was found to be no different in UK in the field of higher education as compared to other sectors (Woodfield & Kennie 2008). But, if the challenges are well addressed by the top-management, organizational commitments, organizational outcomes and training efficiencies; all increase as that in other sectors (Hanaysha 2016). A study in Australian Universities provide some controversial insights, but it advances to the pedagogical and scholarly teaching-learning (Volkov & Volkov 2007), which has not provided sufficient conclusions on the same.

Theoretical Setup

The current research contributes and advances the study of Bandiera, Barankey & Rasul 2013 along with Friebel et al. 2017; showcasing that team performance may also be independent of incentives under a temporal setup. Another vast area of research focused human capital. Productivity of individual agents and accumulative human capital has been conceived of as sources stemming from work experience (eg. Paci 2017). The opposite has not yet been empirically proven. The paper will empirically validate that experience is governed by accumulative or collaborative work. Furthermore, this study will be in line with firm interactions, which helps in increasing firms' productivity (Kellogg 2011).

The study will more specifically correlate to the increasing firms' productivity because of past interactions and collaborations of workers at different levels (Aksin et al. 2021). However, the later study relates more to fluid team performances in specific; the paper also acknowledges the findings of Reagans, Argote and Brooks 2005 that applies to general management. The scope of the current research limits to the educational sector and develops a causal relationship

between higher teaching learning and research efficiency and past collaborative work amongst academicians.

Assumptions for two different strategic setups:

1. Mean and standard deviation of academic standards of students remain the same over time.

2. Procedural identities, institutional affiliations and experience are independent of mean.

3. The models rule out the condition that collaboration of better instructors give better results than that otherwise.

4. It is assumed that there is no exogenous influence on past collaborations.

The Model

The model begins by defining the initial variables for the study: the procedural agent ρ (who act as the primary instructor of a subject), the autonomous collaborator α who had collaboratively performed scholarly tasks or instructive tasks with ρ over the time period ti-j (where i-j refers to the duration of such past collaboration), 'C' represents the collaborative experience represented as a function of ρ, α and ti that leads to the expression: C (ρ, α; ti). F represents the frequency of collaboration between ρ and α over the time period £.

£ ϵ [ti – 365, ti-1] …….. (1)

The study had captured collaborative data over a year (365 days) assuming no holidays or work breaks. Hence, the initial equation becomes:

C (ρ, α; ti) = $\sum_{£=t(i-1)-365}^{t_{i-1}} F_{\rho,\alpha;£}$ …… (2)

The study also considers the depreciation of effectiveness over time. There have been studies showing that past collaborative expertise tend to diminish over higher time lapse (e.g. Benkard 2000). In a teaching learning setup, it was also observed that there can be multiple external expertises providing collaboration to a single instructor during the period of studentship. So, to make the study practical, the benchmark for each student outcome has been related to the average of the collaborations of ρ and α.

At the next level, each autonomous collaborator (α) has been observed to visit and provide expertise to the students in differentiated manner. The frequency F is not the same for all external collaborators to all students over the studentship tenure. Again the course instructor also provides differential support to the students over time. Hence, the study operates with weighted average that takes into account the differential or relative support to the students. The weighted average along with the weightage of relative interaction (ϕ) with the student 'S' is represented as:

$C_s = \sum_{\rho \, \epsilon \, P\,(s)} \phi_{s\rho}$ X C (ρ,α(s); t_i(s)) …… (3.1)

With, $\phi_{s\rho} = \frac{\sum_{z \in Z_S} S\,(\rho(z) = \rho)}{||Z_S||}$ ..... (3.2)

P (s) refers to the combined set of primary instructors for student (s) during the tenure of study. α (s) refers to the specific instructor of 's'. $t_{i\text{-}365}$ (s) indicates the studentship tenure of 's'. $\phi_{i\rho}$ represents relative contribution of ρ to the student over the time i. And Z represents the set of all external collaborators visited over the said tenure.

Equations based on experience or expertises are formulated at the individual level – for the routine instructors and the external collaborators. The experience is simply modelled as the number of instructions given between time period $t_{i\text{-}365}$ and $t_{i\text{-}1}$. The prior experiences are assumed to be constants. The relative interaction of ρ as measured in Equation 3.2. holds for the individualistic equations as well.

The Dependent Variable

Since the main focus lies on the performance of the students, the primary outcome variable deals with the students performing better in subjective assignments and/or dissertations over a two-month period after the interactive session is complete. The indicator of the foresaid performance is kept as being the acceptance or rejection of the dissertation or the assignment, along with the marks given to the accepted assignments. The variable is kept slightly liberal on the ground of revision or resubmission of the assignments. During the tenure of two months, the following post-educative information is also kept under consideration: (i) whether the student is instructed for a special course over and above the curriculum (ii) whether the student is brought in again for additional instruction (iii) whether the student comes back for superficial consultation for the assignment or not (iv) how long the student takes to grasp the outcome-based knowledge (v) the number of tests or examinations the student undergo before completing classroom training and finally, (vi) whether the student takes unusually long time to complete the course work. The last aspect is included as a dummy variable in the causal model.

The Causal Model and Variable definitions

Firstly, the causal regression model is proposed with all the explanatory variables defined in connection to the initial model developed in the previous section. The model goes as follows:

(4) $\mathbf{O_s} = \beta_0 C_s + \boldsymbol{\Omega}_{\alpha(s)} + \beta_1 \boldsymbol{\Psi} + \beta_2 \boldsymbol{\emptyset} + \beta_3 \boldsymbol{p}_{\mathbf{P(s)}} + \beta_4 D_s + \epsilon_s$

Where O_s represents the outcome of a specific student; C_s is the variable defined in Equation 3.1 that represents the combined expertise provided to student (s); the influence of that combined expertise on 's' is represented as the coefficient β_0; **Ω** represents the instructional constant and **Ψ** represents the institutional constant. These two constants are indicative of influences (positive or negative) those are independent of the instruction process and collaboration. **Ø denotes the instructors' and external collaborators' experiences in their own domain. The variable is assumed to be linear. *p* is a set of weighted demographic**

attributes like age, gender, institutional visits etc. 'D' represents the dummy variable pertaining to s, representing nominal scaled attributes; and ϵ is the residual component in the student outcome.

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