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The renewal of business ties and the experimental reproduction of B2B networks

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Abstract

Lo scopo di questo paper è quello di affrontare il quesito: è possibile riprodurre con un modello matematico ed in un laboratorio di practice management, l'evoluzione dei legami di affari intrattenuti dalle imprese con i loro clienti e fornitori? La Letteratura sul rinnovamento e riproduzione dei rapporti d'affari si è prevalentemente concentrata su come le organizzazioni usano l'ICT per replicare le best practices di altre organizzazioni. Il focus delle ricerche svolte ci porta a proporre un modello che permette di specificare come differenti tipi di selezione e longevità influenzino le caratteristiche dei network B2B. Alla base della ricerca è il modello di sistema di rinnovamento studiato da Hans Bolza. Il lato empirico della ricerca è costituito dalla rilevazione effettuata sulle PMI dell'Emilia Romagna, mentre quello sperimentale, dai risultati ottenuti a partire dal 2001 presso il laboratorio di simulazione d'impresa dell'Università di Bologna. La metodologia illustrata in queste pagine, concentrata sul modello di rinnovamento dei rapporti d'affari, può contribuire ad estendere la conoscenza sul tema e ad aprire nuovi spazi di ricerca.

The aim of this paper is to investigate the question: is it possible to reproduce, with a model and in a practice management laboratory, the evolution of business ties managed by enterprises with customers and suppliers? The Literature on the renewal and replication of business relationships is mainly focused on the way organizations apply ICT to replicate the best practices of other organizations. Our focus allows us to propose a model that specifies how different types of ties selection and longevity affect the evolution of B2B Networks. The basis of the research is the Hans Bolza's concept of renewal system. The empirical side of the research is represented by accounting data drawn from Emilia Romagna SMEs and the experimental one by the results obtained, from 2001, in the University of Bologna laboratory of practice management. The methodology illustrated in this paper, focused on the renewal of business ties, would contribute to extend the knowledge about this subject and to open new areas of research.

Keywords: Business links longevity, Hans Bolza, practice management, renewal system, network analysis.

1 - Introduction

In 1968 Hans Bolza published a synthesis of his theory on the renewal system applied in economics (1968) and then extended it to the governance and accountability (1970, 1972).

In reality, the concept of renewal, after an initial interest, was not further developed in the direction opened by Bolza. Instead, more interest was directed to studies seeking to explain the renewal of networks using Granovetter's strong and weak ties hypothesis.

Beyond these attempts, questions and disagreements have arisen over the evolution of networks and the dynamic of business ties **(**Jack S.L.2005). Further advancements (Mahmood, Zhu, Zajac 2011) move away from the traditional focus on network structure and offer a model that specifies how business ties affect the behavior of networks. One question needs to be answered: is it possible to reproduce, with a model and in a laboratory, the evolution of business ties managed by enterprises with customers and suppliers?

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To this purpose two approaches were tested: the Bolza's model of renewal and the practice management by simulimpresa laboratory.

The central concept of the Bolza's model assumed some simple formulas in an integrated system of indexes to measure the performances of a flux of input-output elements as:

$$Ct_n = Ct_0 + e - u \qquad [1]$$

in which:

Ct_n : final consistency

Ct_0 : initial consistency

e : inputs

u : outputs

Bolza proposed three indexes to quantify the renewal of the system in a defined period:

E = Ctn - Ct0 / 2 (Variation Ratio) ; V = e / Ct0 (Turnover) ; T = Ct0 / u (Staying time)

and demonstrated the interconnection :

$$T = 1/ (V - E)$$

evidencing the strict interrelation among T,V,E. Furthermore, this statement highlights that the three indexes represent a coherent tool for the measuring of the renewal system.

The renewal system was after applied on the study of the dynamic of work organization (Bianchi Rosa 1975, Bianchi 1976) combined with the use of a Markow matrix like :

Q_1	Q_2	E
Q_3	Q_4	Ct_0
u	Ct_n	

This matrix expresses the dynamic of different components of the renewal process as individuated at Fig. 1.

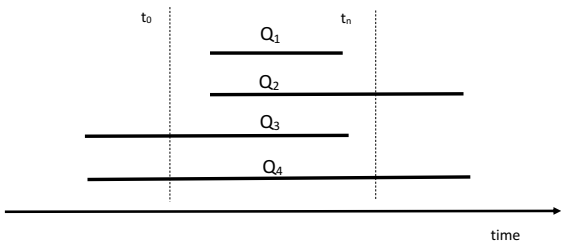


Figure 1: Component tracks of the renewal process

This approach has the purpose to individuate the condition of equilibrium in the dynamic of a renewal based on a flow of Inputs / Outputs in which e and Ct_0 were submitted to the same selection of elements. In the examined case, concerning the renewal of staff, the result was a system ensuring the same selection for existing and new recruited employees (Bianchi 1976) .

The focus was once more on the Selection Rate represented by Ct_n / Ct_0 . Starting from 1980 the research was oriented to the renewal of employees of SMEs situated in Modena Province (Bianchi 1983) and its relationship with the enterprise dimension.

2 - The renewal model applied to business links

The same methodology was extended to links with Customers and Suppliers (C/S) and to the selection rate of business relationships represented by :

$$TSj = C (tj) / C (tj- 1)$$

TSj concerns a yearly selection rate for $j = 1,2,\ldots n$. *C(tj)* is the number of C/S with an active business tie with the company at the end of the *j* year and $C (t_{j-1})$ the C/S at the end of the previous one. This formal advancement allows to investigate on the longevity of business ties.

Among C/S in the period examined and subdivided in *n* phases or sub periods of equal dimension (year term), we assume *n* subsets as distinguishable and each of these as characterized by the presence of that element in s phases or sub periods, with $s = 1,2,\ldots n$.

C/S Code	1^ Year	2^ Year	. .	6^ Year	Tot. Partial for C/S	Years of business longevity of C/S	Yearly Average of turnover ($m_{i,j}$)
1	$a_{1,1}$	$a_{1,2}$	…	$a_{1,6}$	$\Sigma a_{1,j}$	$count (a_{1,j})$	$\Sigma a_{1,j}$ / $count (a_{1,j})$
2	$a_{2,1}$	$a_{2,2}$	…	$a_{2,6}$	$\Sigma a_{2,j}$	$count (a_{2,j})$	$\Sigma a_{2,j}$ / $count (a_{2,j})$
…	…	…	…	…	…	…	…
Tot.	$\Sigma a_{i,1}$	$\Sigma a_{i,2}$	…	$\Sigma a_{i,6}$	$\Sigma a_{i,j}$	$count (a_{i,j})$	$\Sigma a_{i,j}$ / $count (a_{i,j})$

Table 1: Turnover of purchase or sale distinguished for C/S and years of business longevity

Each subset could be submitted to a different selection rate *TS*, as described by [2] referring to the numerousness of Customer or Suppliers that, in the considered period, are present in *s* year.

$$TS_s = C\,(t_{j,s}) / C\,(t_{j-1,s}) \quad [2]$$

$C(t_{js})$ is the number of C/S with s presences, selected for the passage to the following year and $C(t_{j-1,s})$ the number of C/S that in previous year $j-1$ exhibits a frequency of s presences.

Previous researches allowed to point out that the TS_s from the renewal data of C/S system distinguished on the basis of business longevity years, was represented by the profile of the renewal to which the C/S are submitted on the basis of the mentioned selection criteria. The derived curve represents also the longevity of the ties according to the *Ts* applied and the yearly input of C/S elements involved in the company business network.

1^ Year	2^ Year	…	6^ Year	
m 1,1	m 1,2	…	m 1,6	
…	…	…	…	
m i,1	m i,2	…	m i,6	
Σ m i,1	Σ m i,2	…	Σ m i,6	**Σ m i,j**
Σ m i,1 / Σ m i,j	Σ m i,2 / Σ m i,j	…	Σ m i,6 / Σ m i,j	**1**

Table 2: Average data of turnover distinguished for years of business longevity

The source of empirical validation is represented by companies' data of billing in the standard period of six years as the minimum required by tax law to preserve invoices on which the research is carried on.

On this empirical basis we can produce the Table 1 in which: $a_{i,j}$ is the total turnover that the customer i moves in the year j and results from the sum of all the invoices charged to this customer. The number of $a_{i,j}$ of the line i different from zero is indicated by *count* $(a_{i,j})$[1].

[3] allows to obtain medium data of turnover distinguished on the basis of business longevity years (Tab. 2).

$$m_{i,j} = \Sigma\, a_{i,j} / count\,(a_{i,j}) \quad [3]$$

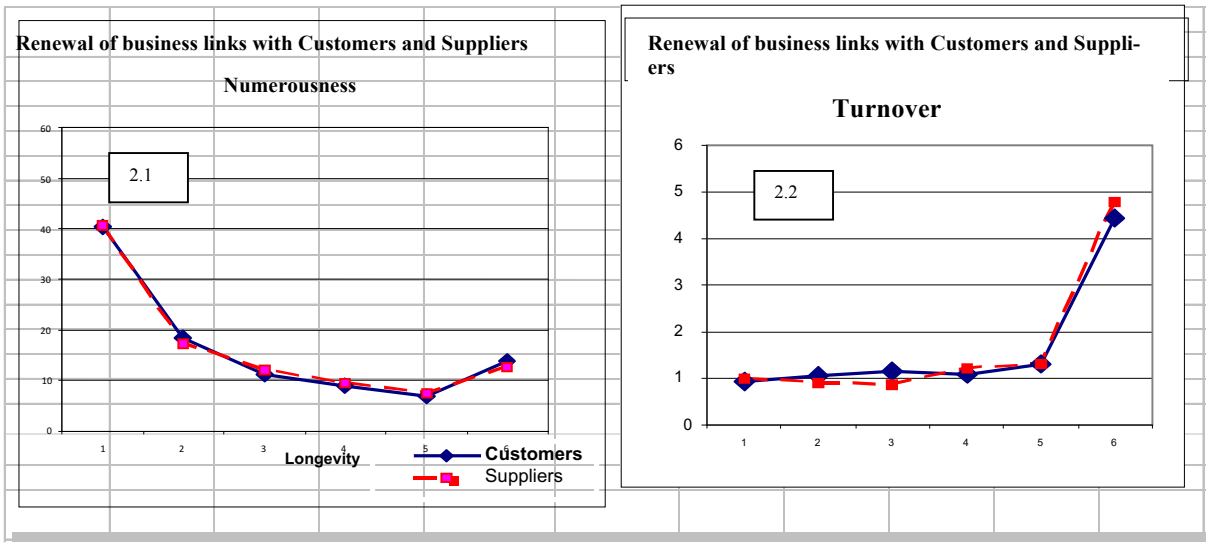
In a similar way we calculate the number of C/S per years of active tie longevity in the considered period, and summarize in Table 3 the data needed to define the longevity curve.

Year	Curve
1	Σ *count* $(a_{i,1})/\Sigma$ *count* $(a_{,i,i})$
2	Σ *count* $(a_{i,2}) / \Sigma$ *count* $(a_{i,i})$
3	Σ *count* $(a_{i,3}) / \Sigma$ *count* $(a_{i,i})$
4	Σ *count* $(a_{i,4}) / \Sigma$ *count* $(a_{I,i})$
5	Σ *count* $(a_{i,5}) / \Sigma$ *count* $(a_{i,i})$
6	Σ *count* $(a_{i,6}) / \Sigma$ *count* $(a_{i,i})$

Table 3: Values of C/S renewal

We evidence that *count* $(a_{i,j})$ gives as the number of years in which, in the period of six years, the longevity of business emerges, justified by the invoices issued with the C/S*i*. The index *i* is assigned in arbitrary way.

Figure 2: Curves of Renewal in Number and Turnover of Business Links with Customers and Suppliers. (Empirical Data)[1]



1 *count ( )* counts the number of inserted elements as parameter, within brackets, of the function and used by the programmes Fortran or Excel

In 2001 an acceleration of calculations was obtained by a computational program elaborated in the Unibo Faculty of Information Sciences in Cesena (FC)[2] with a consequent increase of the number of examined cases.

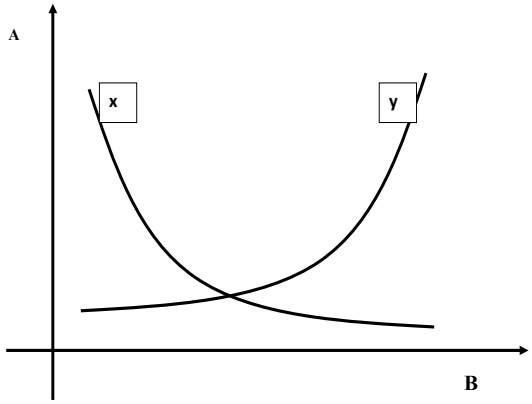


Figure 3: Unified trends of business ties in terms of number and turnover (X and Y curves)

Curve x.
A. incidence of the turnover of the single class of customers or suppliers on the total turnover
B Recurrence of relationships in terms of years (on a 6 years base)
Curve y
A incidence of the quantity of the single class of customers or suppliers on the total quantity
B Recurrence of relationships in terms of years (on a 6 years base)

3 - The analysis of empirical data

For an empirical confirmation of the model was carried on a survey on Emilia Romagna SMEs representative of different sectors existing in this Italian Region (Bianchi 2001). The source of data was the fiscal accounting of value added tax (IVA) concerning Customers and Suppliers. The considered period was limited to six years as the minimum storing period of fiscal documents.

The initial researches started in 1976 (Bianchi, Barzanti 2004), after extended to 2011, leaded to a standardized profile of X and Y curves (Fig. 2). Results evidenced that the profile of the renewal of Customers ties was very similar to the one of Suppliers. This would be not a surprise considering that the orientation of the ties was dependent symmetrically from the role of customer or supplier played by the company in the business relationship.

Assumed as a matter of fact the similarity of C/S trends the two curves was smoothed and superimposed in a single framework summarized in X and Y curves as they refer to numerousness or turnover (Fig.3). In this way, the X curve is considered as the result of a links selection over the time with the appliance to the initial number of relationships with C/S of the selection rate defined by [2]. An homogenous composition of the population of 100 elements submitted to an yearly selection rate of 0,55 with no new entries is assumed (Tab.4).

Year	Customers/Suppliers Population	Selection %	Years	C/S Population
1°	100	0,55	1°	100
2°	55	0,55	2°	55
3°	30,25	0,55	3°	30,25
4°	16,6375	0,55	4°	16,6375
5°	9,150625	0,55	5°	9,150625
6°	5,03284375	0,55	6° - 15°	11,15576845
7°	2,768064063	0,55		
8°	1,522435234	0,55		
9°	0,837339379	0,55		
10°	0,460536658	0,55		
11°	0,253295162	0,55		
12°	0,139312339	0,55		
13°	0,076621787	0,55		
14°	0,042141983	0,55		
15°	0,02317809	0,55		

Table 4: Simulation of the evolution of C/S number with a steady selection ratio

In this way, the X curve is considered as the result of a selection with the appliance of [2] to the initial number of C/S relationships. An homogenous composition of the population of 100 elements submitted to an yearly selection rate of 0,55 with no new entries is assumed (Tab.4).

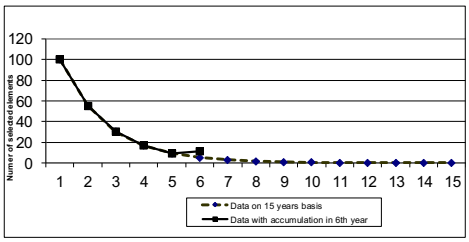


Figure 4: Trend of a population submitted to a stable selection with and without accumulation on the sixth year

Further studies (Bianchi, Tampieri 2013) detailed the behaviour of the renewal system from the point of view of numerousness (X curve) in different conditions and extended the analysis to the turnover. Par-

2. The program RiXY is available on http://pyrrot.it. by F. Pirrottina – University of Bologna, Faculty of Maths, Physics and Natural Sciences

ticularly was examined what trend of renewal could better represent X curve.

With the purpose to compare the trend X empirically derived from the ground, it was reproduced the effect of a TS steady ratio on a population of C/S (Tab. 4). The corresponding graph confirms its similarity with the model (Fig.4). The theoretical model reproduces also the peak of the 6th year derived from empirical data and confirmed its adequacy to represent the renewal system surveyed on the ground. Really, the data of the 6th year represent an accumulation of the survived links with a longevity of 6 years and more (Fig.5).

As it concerns the numerousness, two perspectives was simulated:

1) A different trend of *Ts* (increasing, stable or decreasing)

2) With a different trend of yearly entries (increasing, stable or decreasing).

Figure 5: Equivalence of 6th year frequency accumulation of links with 6th and more years of longevity

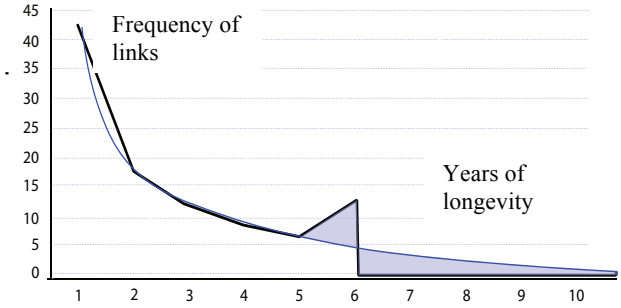


Table 5: Numerical incidence of C/S distinguished per classes of longevity with an introduction of 10 C/S each year and decreasing T

ear										0
	,00									
	,67	,33								
	,57	,28	,15							
	,52	,25	,14	,09						
	,49	,24	,13	,08	,06					
	,47	,23	,13	,08	,05	,04				
	,45	,22	,12	,08	,05	,04	,03			
	,44	,22	,12	,07	,05	,04	,03	,03		
	,43	,21	,12	,07	,05	,04	,03	,03	,02	
	,42	,21	,12	,07	,05	,04	,03	,02	,02	,03
Series with a maximum of six years		,42	,21	,12	,07	,05	0,14			

The hypothesis of *Ts* relating to the C/S ties longevity could reproduce different strategies in the management of business relationships.

The increasing *Ts* is connected to an Exploring strategy oriented to incentive new entries.

The decreasing *Ts* would represent an Exploiting strategy targeted to maintain and foster the C/S loyalty.

The process simulated at Tab. 5 reproduces the start-up of the C/S network referred to a period of 10th years before the reaching of a stabilized asset in an hypothesis of decreasing *Ts*.

From this data, we obtain the incidence of C/S distinguished in classes of longevity with yearly stable entries with an accumulation in 6th year owing to next periods not detectable in the empirical survey.

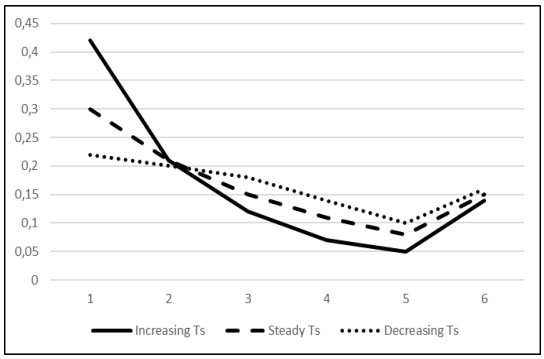
Table 6: Different TS trends applied to a period of 10th years

Years of Ties Longevity (On a 10th years basis)	Increasing *Ts*	Steady *Ts*	Decreasing *Ts*
	A	B	C
1	0,43	0,71	0,99
2	0,49	0,71	0,93
3	0,55	0,71	0,87
4	0,62	0,71	0,80
5	0,68	0,71	0,74
6	0,74	0,71	0,68
7	0,80	0,71	0,62
8	0,87	0,71	0,55
9	0,93	0,71	0,49
10	0,99	0,71	0,43

4 - The simulation of the renewal in different conditions

The reproduction of increasing or decreasing *Ts* (Tab 6) assumes a *Ts* minimum of 0,43 derived from the empirical sample and an arbitrary maximum of 0, 99. The steady *Ts* (0, 71) was an average between these values.

The results of this comparison represented at Fig. 6 evidence that the continuous line corresponding to decreasing *Ts* is the more similar to the empirical trend represented at Fig. 2.1.



Ts		Years of Business Longevity					
		1	2	3	4	5	6
A.	Increasing	0,42	0,21	0,12	0,07	0,05	0,14
B.	Steady	0,30	0,21	0,15	0,11	0,08	0,15
C.	Decreasing	0,22	0,20	0,18	0,14	0,10	0,16

Figure 6: Percentage of C/S ties longevity (Numerousness data). Comparison of different Ts trends

To investigate the effects on ties longevity of the variation of the number of Inputs, we simulated a ten years renewal with a variable Input characterized by 10 +/- of entries a year[3].

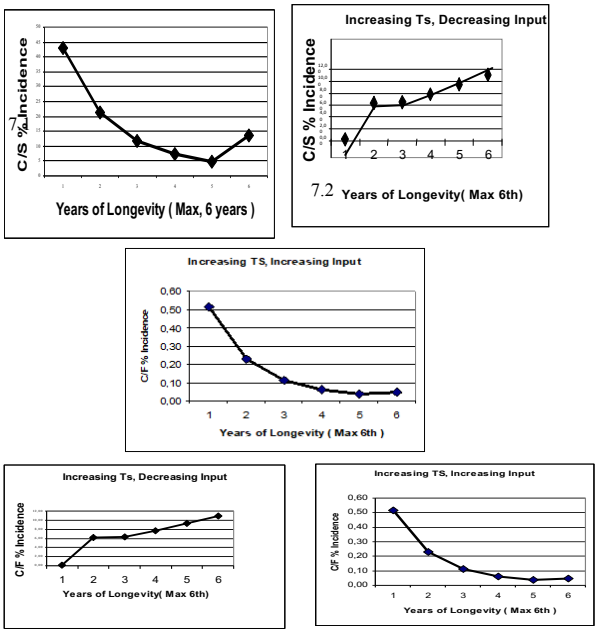


Figure 7 - Longevity curves with increasing Ts and different Input trends.

Series with Increasing TS and Decreasing INPUT

Year	TS	e		Ct1	Ct2	Ct3	Ct4	Ct5	Ct6	Ct7	Ct8	Ct9	Ct10
1	0,43	100	43	43									
2	0,49	90	39	21	60								
3	0,55	80	34	19	12	65							
4	0,62	70	30	17	11	7	65						
5	0,68	60	26	15	9	7	5	61					
6	0,74	50	22	13	8	6	4	4	56				
7	0,80	40	17	11	7	5	4	3	3	50			
8	0,87	30	13	8	6	4	3	3	3	3	43		
9	0,93	20	9	6	5	4	3	3	2	2	2	36	
10	0,99	10	4	4	4	3	2	2	1	2	2	2	27
Series 6th years max		27	4	4	4	3	2	9					
			0,16	6,25	6,34	7,63	9,28	10,93					
Years of Longevity			1	2	3	4	5	6					

Series with Increasing TS and Increasing INPUT

Year	TS	e		Ct1	Ct2	Ct3	Ct4	Ct5	Ct6	Ct7	Ct8	Ct9	Ct10
1	0,43	10	4,3	4,3									
2	0,49	20	9	2	11								
3	0,55	30	13	4	1	18							
4	0,62	40	17	6	2	1	27						
5	0,68	50	22	8	4	1	0	35					
6	0,74	60	26	11	5	2	1	0	45				
7	0,80	70	30	13	6	3	1	1	0	54			
8	0,87	80	34	15	7	4	2	1	1	0	64		
9	0,93	90	39	17	8	4	2	1	1	1	0	74	
10	0,99	100	43	19	9	5	3	2	1	1	0	0	84
Series 6th years max		84	43	19	9	5	3	4					
			0,51	0,23	0,11	0,06	0,04	0,05					
Years of longevity			1	2	3	4	5	6					

Table 7: The simulation of ties renewal with a Decreasing and Increasing Input

The simulated process (Tab.7) starts respectively from 0 to 100. It is restricted – to compare it with empirical data – in six years with an accumulation for the 6th year as demonstrated at Fig. 5. Further step is the calculation of the incidence of C/S longevity in numerousness used to build the X Curve (Tab.7).

These data represented in a graph make evident some items concerning the connection among the ties longevity and the network.

Examining the longevity curves at Fig. 7.1 and at Fig. 7.3 – stable and increasing level of yearly input - we can notice that we have a shape in which most of ties are concerning desultory business relationships(1-2 years of continuity). At the same time, these short-lived links could represent the start-up of future collaborations and the birth of next loyal links.

The trend at Fig.7.1. shows the best similarity with the empirical one and represents the networks characterized by low Ts of loyal ties and high selection of new entries.

5 - The comparison with experimental data of practice firm laboratory

To complete the analysis we can compare empirical X curve with the experimental results of Practice Firm (PF) laboratory. The PF is an active teaching method-

[3] The case of a steady number of entries is included in the analysis of the previous paragraph and showed at Tab.5

ology based on a learning by doing approach aiming to reproduce in a laboratory the functioning of an actual business in aspects related to its strategy, organization, accounting and marketing (Gualdi, 2016).

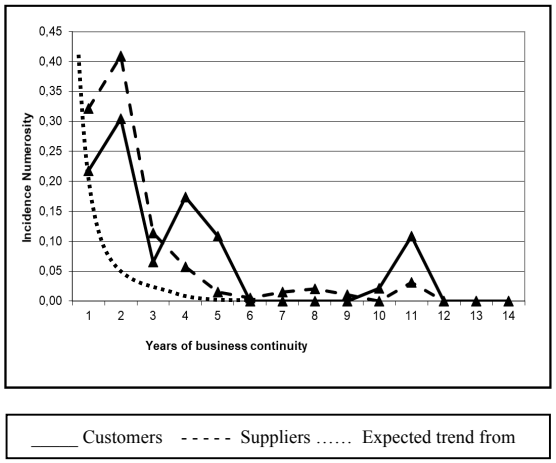


Figure 8 -The X Curve (Numerousness) in Practice Firm Laboratory

PFs are set up with key business functions such as administration, personnel, commercial, etc., in which students perform a specific task, with a high degree of closeness to reality (Troudt et alii, 2010; Dessinger, 2007.

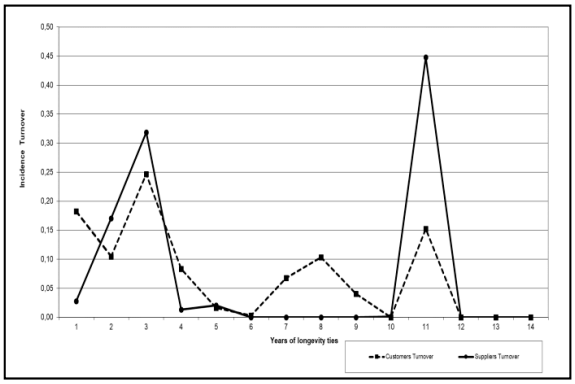


Figure 9: The Y Curve (Turnover) in the Laboratory Practice Firm

This methodology represents a concrete tool to reproduce in a controlled situation the behaviour of business links established during the PF performance. (2017 Bianchi, Gualdi, Tampieri).

A first analysis evidences that, as it concerns the X Curve experimentally derived from PF Laboratory, we have a trend (referring to six years) similar to the empirical one (Fig. 8) while the Y Curve it does not coincide. Furthermore, it assumes a trend quite different from the model (Fig. 9).

6 - Conclusions

The focus of this study was to demonstrate the utility of Bolza's model in the analysis of the renewal of business ties and its adequacy to reproduce the dynamic of B2B networks managed by enterprises.

Key findings of the study, validated in the empirical and experimental field, are:

1. The confirmation of X Y curves as adequate tools to represent the dynamics of business ties particularly with regard to the longevity of ties and the selection ratio to which ties are submitted.

2. The comparison of X curves derived from the proposed mathematical model and the empirical and experimental findings confirms an adequate coherence of the model with the dynamics of C/S networks with regard to the longevity of ties (Fig. 10).

3. The X curve obtained from the survey on SMEs and the experimental laboratory corresponds to an increasing *Ts* and a stable input of C/S new entries.

4. The behaviour of the Y curve regarding the turnover renewal (Fig. 9) produced non-definitive results. It seems reasonable to assume that the deviation from the mathematical model and the empirical findings derives from irregularities in the normal longevity of business ties. Researches in progress give interesting results concerning the connection of perturbations in the renewal of C/S networks and the pre-crisis conditions of enterprises. To this purpose, it is meaningful that the experimental results, while confirming the standard course of the X curve, did not apply to the Y curve.

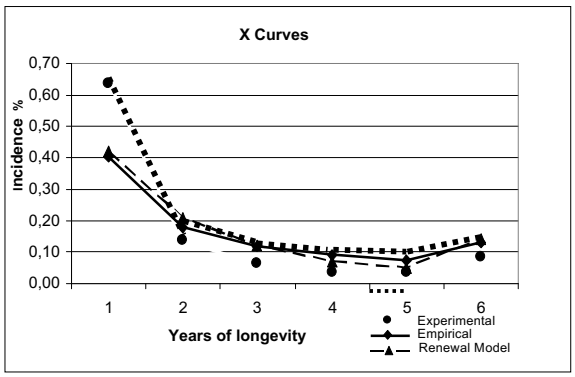


Figure 10: Comparison of X curves derived from renewal model, empirical and experimental one

This anomaly is attributed to the limited period in which the simulated business is managed in the PM laboratory where classes of students rotated at most every six months. This surely could affect the length of simulated business with C/S and introduce perturbations in the derived network.

These results could be discussed along some different perspectives.

Firstly, it's quite uncommon the use of a didactical tool like practice management in a scientific research. The conditions under which entrepreneurial experiments take place are quite different from the SMEs realities particularly, as mentioned in the paper, because of the discontinuity of the activities carried on by students. On the other hand it is quite agreed upon that (Gualdi 2016) this methodology is more realistic than a business game or a simulation using sophisticated software (Fayolle 2007; Kinicki,Fugate 2012).

Another view derives from the neglect of the Bolza's renewal model in economic studies. As a matter of fact, we demonstrated the strength and the potential of this tool for the analysis of business ties and its implications outside the economic field in which it was conceived. Nevertheless, this is one of the purposes of the paper, aiming to trigger a discussion focused on the technical assumptions and utility of this model inexplicably ignored by the theory.

The insertion in a unique model of links with Customers and Suppliers can be criticized as a comparison between two elements subjected to different dynamics. Although this position could be reasonable, the empirical and experimental findings of the research confirm some unequivocal similarities in the renewal profiles of C/S.

To conclude, we feel that further analysis on the ground and more extended validation processes would add to our understanding of the issues that we hope to have raised with this paper.

References

Bianchi M. (1976), Il *problema del rapporto fra teoria e pratica in organizzazione aziendale*, Patron, Bologna, Italia.

Bianchi M. (1983), *Dinamica del personale ed evoluzione delle strutture organizzative nelle industrie in provincia di Modena*, Clueb, Bologna, Italia.

Bianchi M.(2001), Le relazioni interaziendali nella rilevazione e valutazione dei confini organizzativi. *Processi di terziarizzazione dell'economia e nuove sfide al governo delle aziende, Atti del XXIII Convegno AIDEA* , McGraw-Hill.

Bianchi M. and Barzanti L. (2004), Stabilizzazione delle relazioni interaziendali e apprendimento organizzativo, *Economia Aziendale 2000WEB*, No. 1, www.ea2000.it.

Bianchi M. and Tampieri L. (2013), Longevity of business ties and input variation of new entries in company's networks. *AIDEA,* 2013 *Il ruolo dell'azienda nell'economia. Esiste un modello aziendale orientato alla crescita? Track: Organization & Management Theory, Design and Change SUB TRACK 4.3: Organizing for Growth. On line conference proceedings,* No.238.

Bianchi M. and Rosa M. (2015), Applicazione ad un'azienda agricola dell'analisi dei fattori organizzativi secondo il metodo di Markov, *Rivista Trimestrale di Scienza dell'Amministrazione*, Anno XX

II, No. 2.

Bianchi M. and Tampieri L. (2016), The UNIBO Laboratory of Practice Management in the Research on Project Organizations. *Working Paper: Sub - Theme 72: Challenges and Balancing Acts in Organizing* and presented at the *32nd EGOS Colloquium "Organizing in the Shadow of Power",* Naples, Italy, 7–9 July.

Bianchi M., Gualdi D. and Tampieri L. (2017), The role of organizational ties managed by practice firms. The case of Perting. *Ltd RIO journal*, *special issue,* June.

Bolza H. (1968), Il concetto di aggregato di rinnovamento come principio guida in economia, *Riv. Internazionale di Scienze Economiche e Commerciali,* Università Bocconi, Milano, No.10.

Bolza H. (1970), *Il concetto di rinnovamento come principio guida della contabilità economica*, Kirschbaum, (eds.).

Bolza H. (1972), *Il concetto di rinnovamento applicato alle questioni attuali della condotta economica*, CEDAM (eds.), Italy.

Fayolle A. (Ed.) (2007) Handbook of Research in Entrepreneurship Education, MPG Books, Vol.1

Gualdi D. (2016) Manuale di Simulazione d'Impresa, Il Ponte Vecchio, Cesena 2016.

Kinicki A.,and Fugate M.(Eds) (2012) Organizational Behavior: Key Concepts, Skills And Best Practices, 5th ed. Publisher: McGraw-Hill

Jack S.L. (2005) The Role, Use and Activation of Strong and Weak Network Ties: A Qualitative Analysis, *Journal of Management Studies*, Volume 42, Issue 6, September pages 1233–1259

Mahmood I.P., Zhu M.H. and Zajac E.J (2011) Where can capabilities come from? Network ties and capability acquisition in business groups, *Strategic Management Journal*, V.32, I.8

Sittler R. (1956) *Systems Analysis of Discrete Markov Processes*, IRE Transactions on Circuit Theory (Vol. 3, Issue: 4, December).