CAPSI 2012

“Buying Behavior and Competition in the Software Market”

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Contents

I. Research Objectives and Question

Research Objectives

To study the influence in the consumers choices decisions of Information Systems market factors like :

- ‘network effects’;
- ‘switching costs’;
- ‘lock-in’, …

considering Open Source Software vs. Proprietary Software and Operating Systems and Office Suites for personal Computers.

Research Question

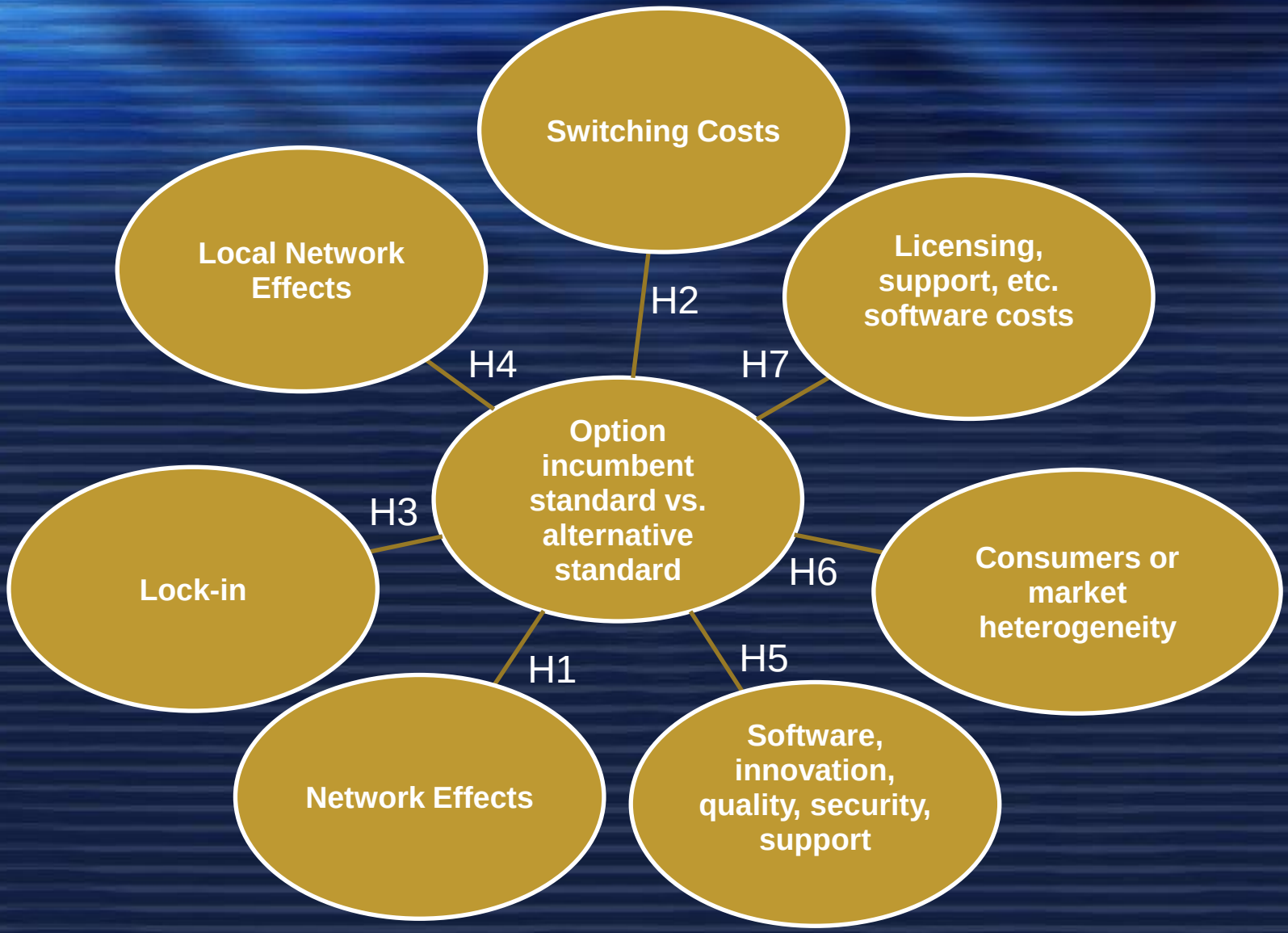
Which factors have influence on the buying process decision of desktop Operating Systems and Office Suites considering Open Source and Proprietary software alternatives and how they influence these choices?

II. Literature Review, Hypotheses and Research Questions

Hyphotesis and Literature Review (Demand)

Hypothesis	Description	
H1	The higher the network effects in the market *(Katz and Shapiro 1985), (Economides 1996), …*	The lower the probability that the consumer will choose the alternative standard against the incumbent standard
H2	The higher the switching costs in the market *(Farrel, Saloner 1985, 1986), (Klemperer 1987), (Langlois, Robertson 1992), …*	
H3	The higher the lock-in (weak and strong) *(Farrel and Saloner 1985, 1986), (Liebowitz and Margolis 1990, 1994, 1995) (Liebowitz 2000), ...*	
H4	The higher the local network effect in the market *(Dalle 1997), …*	
H5	The better the perception regarding innovation, quality, security, support, etc. of the incumbent standard (*Liebowitz and Margolis 1996*) , ...	
H6	The higher the heterogeneity of the consumers (the lesser the network effect) *(Dalle 1997), ...*	Higher probability that the consumer will choose the alternative standard against the incumbent standard
H7	The lesser associated costs to adoption of the alternative standard (licensing, support, training, compatibility, etc.) *(Bonaccorsi and Rossi 2003),* (*Krishnamurthy 2005), ...*	

Research Questions and Hyphotesis



III. Data Analysis Methodology and Data Collection

Data Analysis Methodology

Which factors have influence on the buying process decision and the option between Proprietary Software and Open Source Software in the IS market?

Methodology

Statistical analysis with application of factor analysis to build the constructs and logistic regression to build a choice model applying the different variables and constructs, as considered by the literature review.

(Pilot-experience to test the questionnaire easiness, using a sample of students of Escola Superior de Comunicação Social (ESCS), Instituto Politécnico de Lisboa)

Data Analysis Methodology

Which factors have influence on the buying process decision and the option between Proprietary Software and Open Source Software in the IS market?

Methodology

. Constructs building: Cronbach-alpha test and factor analysis. Hypothesis test: non-parametric Wilcoxon Signed Rank test or parametric t-test (5% significance) choice after normality Kolgorov-Smirnov test.

. Second research stage: Logistic regressions of Operating System and Office Suite choice models

Data Collection (1/2)

Organizations

Sample

. More than 4800 contacts collected from several annual rankings of Small and Medium Companies and Large Companies published by the main economic magazines and newspapers and databases available from Master and PhD colleagues.

Data collecting

. Questionnaire available in *Instituto Superior de Economia e Gestão* (ISEG) website.

Data Collection (2/2)

Questionnaire

Nr. questions	Aspects covered in the 5-point Likert scale questions
2	Applications and file compatibilities with business partners
3	Legacy files or applications still in use
1	Factors that influence software choices (18 factors)
1	Knowledge of main software suppliers (12 PS and OSS brands)
6	Innovation, quality and security perception of different brands (software) in the market (Operating Systems-7; Office Suites-8)
2	Innovation, quality and security perception of PS vs. OSS
1	Costs considering PS and OSS
1	Technical support availability for PS and OSS
5	Easiness of switch Operating System and/or Office Suite switch and influencing factors on that easiness (OS-8 factors;Office- 6)

IV. Research Results and Research Conclusions

Research Results (1/7)

Hyp.	Variables and Constructs	A	B	C
H1	Network Effects	✓	✓	✓ (3)
H2	Switching costs	✓	✓	✓
H3	Lock-in	✓	✓	✓
H4	Local network effects	✓	✓	✓ (2)
H5	Software innovation, quality, security, support	✓	✓	✓
H6	Market heterogeneity degree	✓	✓ (1)	-
H7	Software costs (licensing, support, etc.)	✓	✓	-

(1) Only in Operating System model; (2) Only in Office Suite model; (3) Indirectly through H2d

(A) Statistical significant variables and constructs associated with the thesis hypotheses that are influencing factors in Operating System and Office Suite choices;

(B) Logistic regression. Only hypothesis with coherent sign variables and constructs, even if not Wald statistical significant;

(C) Logistic regression considering only hypothesis coherent sign variables with statistical significance (significance level of 10%).

Research Results (2/7)

Hyp.	Variables and Constructs	Comments	OS	OFFS
H1	Network Effects	. Applications available in market for OS and possibility of use same application as business partners (Operating System). . File compatibility with partners (Office Suite);	**I**	**I**
H2	Switching costs	Exist, being lower for the Office Suite switch;	**I**	**I**
H3	Lock-in	Weak lock-in caused by path dependence (same application updated through the years) and also influenced by switching costs: . Computer, peripherals and applications owned (Operating System) . Knowledge to install, uninstall, and work with software (Operating System and Office Suite) . Incumbent files owned (Office Suite) ;	**I**	**I**
H4	Local network effects	Exist through IS staff inside or outside the company. While the advice can go one way or another, it seems to favor OSS (IS staff means less search need for technical support and less knowledge lock-in);	**A**	**A**

OS - Operating System model; OFFS - Office Suite model; I – Incumbent; A – Alternative Open Source Software

Research Results (3/7)

Hyp.	Variables and Constructs	Comments	OS	OFFS
H5	Software image, innovation, quality, security, support	. Software image global perception and consideration of actual and potential future needs relevant in choices; . No statistically significant difference between OSS and PS Operating Systems and Office Suites global image; . No statistically significant difference between OSS and PS global perception (image, quality, security); . PS has statistically significant advantage in the comparison between OSS and PS technical support availability;	**I**	**I**
H6	Market heterogeneity degree	Low IS heterogeneity with Microsoft Windows and Microsoft Office dominating the IS environment;	**I**	**I**
H7	Software costs (licensing, support, etc.)	Software global costs relevant in choice and OSS perceived as cheaper than PS.	**A**	**A**

OS - Operating System model; OFFS - Office Suite model; I – Incumbent; A – Alternative Open Source Software

Research Results (4/7)

Statistically not confirmed

Hyp.	Variables and Constructs
H1 Network Effects	Installation of same software as the business partners
H3 Lock-in	. Weak lock-in considering older applications and files not updated with new software versions . Office Suite weak lock-in due the personal computer available
H4 Local network effects	Advice from sources that aren't Information Systems staff

Research Results (5/7)

Operating System to install if new computers without software bought by the company

Near eighty per cent of companies will install the same Operating System

Software installed (percentage of sample companies)

Actual Situation

Windows=100%

Install in new PC

Apple MacOS=4.3%
Caixa Mágica Linux=2.2%
Microsoft Windows=79.6%
Novell/Suse Linux=4.3%
Red Hat Linux=9.6%

Research Results (6/7)

Office Suite to install if new computers without software bought by the company

Near sixty-nine per cent of companies will install the same Office Suite

Software installed (percentage of sample companies)

Actual Situation

MS-Office=95.7%

OpenOffice=4.3%

Install in new PC

Apple iWork=1.1%

IBM Lotus SmartSuite=1.1%

Microsoft Office=68.8%

Open Office=26.8%

Sun StarOffice=2.2%

Research Results (7/7)

Factors that influence software choices and the option between Proprietary Software and Open Source Software in the IS market.

Statistically confirmed that factors like network effects, switching costs, lock-in or local network effects can influence the user decisions beside the price, advertising and other more traditional marketing factors.

V. Research Contributions and Limitations

Research Contributions (1/3)

Academics

Identification of the factors that influence the consumer choices between incumbent and alternative software standards and between Open Source Software and Proprietary Software.

Users

A better knowledge of the Information Systems market, and the decision factors that can be considered in their purchases.

Research Contributions (2/3)

Supplier Managers

A better knowledge of the buying process of Information Systems users and how that can influence the market evolution and the competition level. Better knowledge of the critical factors needed to obtain success in this market.

Research Contributions (3/3)

Government and Regulation Authorities

A better knowledge of the different factors that can influence the competition level of the Information Systems market through consumer choices, to help in the decisions regarding authorities market intervention to defend competition and stop anti-competitive actions of dominant companies.

Research Limitations

- Market sample dimension
- Worldwide generalization
- Some missing answers in the questionnaire
- Dynamics of the IS markets

Future Research

- Temporal evolution of choice's influencing factors;
- Research considering other consumer segments;
- Research on other software categories like multimedia software, database software and browsers or other platforms like servers, smartphones, tablets or social networks;
- Evolution of the file compatibility between alternative applications considering the "openness" of the formats and their influence over the market evolution;
- New trends in the Information and Communication Systems markets like "Cloud Computing or "Software as a Service";
- Impact on organizations of the shift from Proprietary Software to Open Source Software.

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Obrigado!

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