Career abandonment intentions among software workers

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ABSTRACT

Within the software development industry, human resources have been recognized as one of the most decisive and scarce resources. Today, the retention of skilled IT personnel is a major issue for employers and recruiters as well, since IT career abandonment is a common practice and not only means the loss of personnel, knowledge and skills, but also the loss of business opportunities. This paper seeks to discover the main motivations of young practitioners to abandon the software career. To achieve this objective, two studies were conducted. The first study was qualitative (performed through semi-structured interviews) and intended to discover the main variables affecting software career abandonment. The second study was quantitative, consisting of a web-based survey developed from the output of the first study and administered to a sample of 148 IT practitioners. Results show that work-related, psychological and emotional are the most relevant group of variables explaining IT career abandonment. More specifically, the three most important variables that motivate employees to abandon the career are: effort-reward imbalance, perceived workload and emotional exhaustion. In contrast, variables such as politics and infighting, uncool work and insufficient resources influence to a lesser extent the decision to leave the career.

Keywords: Software personnel; Career Abandonment; Career commitment

INTRODUCTION

Information technology (IT) has been fundamental for improving productivity as well as for the development of knowledge-intensive products and services (Soto-Acosta, Martinez-Conesa & Colomo-Palacios, 2010). However, engaging in IT investment is not a necessary nor sufficient condition for improving performance, since IT investments might be misused (Tallon, Kraemer & Gurbaxani, 2000). Today, the successful exploitation of IT within the business is dependent upon the availability of IT professionals to design and integrate IT infrastructure and applications (Agarwal & Ferratt, 2002). This statement has been supported by scholars, arguing that IT human capital represents a strategic resource for firms, which has the ability to bestow competitive advantages (Bharadwaj, 2000; López-Fernández, Martín-Alcázar & Romero-Fernández, 2010; Wade & Hulland, 2004).

Within today's IT scenario, firms recognize the importance of information systems (IS) management for firm performance and functioning (Yeh, Lee & Pai, 2011). Managing IS is a core capability of an organization because it helps to control critical downstream and upstream data (Chang, 2009). However,

in spite of the strategic importance of IS to organizations, a large percentage of IS implementations still fail to deliver benefits or solve the problems for which they are intended (Westlund, 2011). One of the origins of such problems is personnel (Colomo-Palacios et al., 2010; Colomo-Palacios et al., 2011).

In the IS field, hiring, training, and keeping good employees is important to create and sustain competitive advantages (Hsu et al., 2003). More specifically, within the software development industry, personnel have been recognized as one of the most decisive resources. Although human resources are recognized as key for the success of projects, sometimes they are source of deficiencies (McConnell, 2003). Software development engineers are considered 'intellect workers' (DeMarco & Lister, 1987) or 'knowledge workers' (Drucker, 1993), who are characterized by possessing high levels of education and specific skills as well as the ability to apply these skills to identify and solve problems (Ryan & O'Connor, 2009). Not in vain, software development is a human centric and sociotechnical activity (Casado-Lumbreras et al., 2011) influenced by personnel factors. Thus, software companies require highly skilled human resources (Palacio et al., 2011). These knowledge workers, pertaining to software development teams, are key human resources in the software development process and their shortcomings and caveats (Pressman, 2005). For example, Hazzan and Hadar (2008) stated that there is abundant empirical evidence which proves that human aspects are the source of the main problems associated with software development projects.

Another issue is the shortage of IT professionals all over the world, which has been pointed out by many works and reports (e.g. Acharya & Mahanty, 2008; Agarwal & Ferratt, 2002; Mithas & Krishnan, 2008). The problem is quite complex. On the one hand, the discipline is suffering from the erosion of its student base (Hirschheim & Newman, 2010) because of the low attractiveness of the profession in terms of image (García-Crespo et al., 2008) and status (Day, 2007) and, on the other hand, there are several issues that are affecting software professionals' continuity in a given organization, being the main ones: career commitment and turnover. Blau (1985) defined career commitment as "one's attitude towards one's profession or vocation". Moreover, the National Survey of College Graduates reported that only 19% of computer science graduates remained in the field 20 years later, while 52% of civil engineering graduates did so (Cappelli, 2001). As a consequence of this, the war for talent (Michaels, Handfield-Jones & Axelrod, 2001) in the IT sector has its battlefield outside and inside the company.

The aim of this paper is to investigate what are the main drivers of career abandonment for software development engineers. More precisely, this paper seeks to discover the main motivations of young practitioners to abandon the software career. The paper consists of four sections and is structured as follows. The next section outlines relevant literature in the area of people continuity in software development teams. Section 3 describes the characteristics of the study conducted and, finally, section 4 offers several conclusions and provides future lines of research.

STATE OF THE ART

The IT profession as a whole and software practitioners, in particular, experience considerable volatility with regard to employment and staffing. Given that circumstance, a company's human resources can be a source of competitive advantage that is difficult for competitors to imitate (Kuean, Kaur & Wong, 2010), the issue is crucial for human resource managers. Thus, the retention of skilled IT personnel is a major issue for employers and recruiters as well. The abandonment of IT employees not only means the loss of personnel, knowledge and skills, but also the loss of business opportunities (Moore & Burke, 2002).

Turnover has been a major issue affecting IT personnel since the very early days of computing and continues in the present (Korunka, Hoonakker & Carayon, 2008). Chou & Chou (2011) suggested that a firm must carefully maintain relations with employees and conduct reasonable workforce management to cut down personnel turnover rate which, in turn, helps maintaining project's continuity and reduces the risk of workforce disturbance. Chang (2010) showed that the turnover rate of IT personnel in the USA increased from 20% in the seventies to 33% in the nineties. Thus, the continuing high turnover of IT

personnel presents an important challenge to managers (Quan & Cha, 2010). Personnel turnover has its drawbacks, but also its advantages (Ghapanchi & Aurum, 2011). Some of the identified drawbacks include: direct recruiting and training costs as well as indirect costs due to disruptions in organizational processes. The most frequently found advantages, according to (Ghapanchi & Aurum, 2011), are: new employees are often paid lower salaries than the ones replaced, the advent of new knowledge, ideas, and experience as well as enhanced opportunities for promoting those who stay. However, it seems that IT personnel turnover does not change the overall workforce dedicated to the profession. It only changes the positions of IT practitioners among and within companies.

Enrollments in computer science university degrees have dropped significantly (Lee & Lee, 2006), causing a severe shortage of new graduates (Allen et al., 2008). This shrink in the workforce is even more important when analyzing career abandonment as reported by Cappelli (2001). The reasons for this may be rooted on the nature of the work. The IT work has been labeled as "stressfull" (Engler, 1998), although this stress is not equally distributed among junior and senior practitioners (Bradley, 2007). The fact is that there are many factors leading professionals to stress. The most significant stressors, according to Love et al. (2007), are: work overload, role ambiguity and conflict, career progression, diverse personalities, changing technology, redundancy, limited resources, financial pressures, budget constraints, and so on. Sethi, King and Quick (2004) identified a total of 33 stressors that were classified in the following categories:

- Training: need for appropriate training and skills development to complete tasks.
- Deadlines: Issues related to the need to complete projects within schedule.
- Coworkers: power struggles and conflicts that may result from working with others.
- Performance evaluations.
- Job security: job loss due to downsizing, mergers, or other variables.
- Career development: Continuous skill development issues.
- User demands: pressures put on staff by users, such as dealing with the IS user interface.

The increasing pressure of these variables has lead to an increasing incidence of absenteeism and high-turnover rates in the field (Love & Irani, 2007). Another consequence is that many IT personnel realize that they either must constantly engage in retraining or seek out another field of employment (Joseph, Ang & Slaughter, 2005).

Based on the push–pull–mooring framework (Zmud, 1984) and the investment model, Fu (2011) propose that push (e.g., satisfaction and threat of professional obsolescence), pull (e.g., attractive alternative), and mooring variables (e.g., career investment and profession self-efficacy) play a key role regarding whether a professional intend to stay in or leave a career.

Within the IT industry, the diversity of fields provides panoply of different situations to workers. So far, no studies have analyzed career commitment and abandonment variables of young software development professionals. The aim of this study is therefore to investigate into these issues.

A STUDY OF ABANDONMENT INTENTIONS AMONG SOFTWARE PERSONNEL

Overall process

The overall process conducted to perform the study is depicted in Figure 1 and consisted of two studies. Each study was divided into three consecutive phases: planning, data collection and analysis. The first study was qualitative and intended to discover the main variables related to career abandonment among

software workers. The study was performed through a set of semi-structured interviews with a sample of professionals. This study used Content Analysis, which was complemented with an inter-judge reliability test conducted to find out the extent to which external judges agreed with the results obtained.

To conduct the second study, a quantitative approach was employed. More specifically, based on the output of Study 1 an online questionnaire was developed and administered to a set of software practitioners. Results were analyzed by using a set of statistical tests, including descriptive statistics and mean differences.

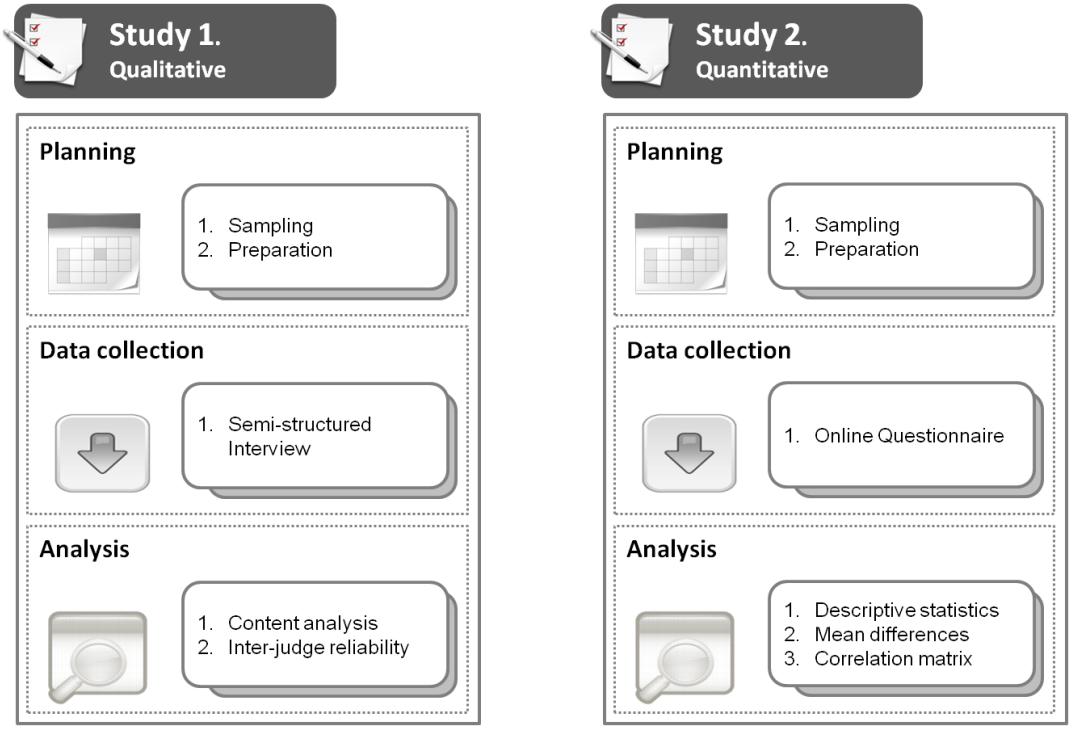

Figure 1. Overall process of the study

Study 1: Qualitative Study

PLANNING

The objective of the qualitative study was to obtain a list of variables affecting software career abandonment among young practitioners with sufficient experience. To achieve this objective, a group of twenty software practitioners from 4 different companies was selected and interviewed using a semi-structured interview. These subjects were selected from their personal and academic contacts. The sample consisted of 6 women and 14 men, with an average age of 28.8 and an average working experience of 4.6 years. Subjects were selected from those who answered positively to a personal invitation sent by the authors. All the participants had abandoned the IT career in the last two years.

DATA COLLECTION

The semi-structured interview was assisted by at least one of the authors. The average interview lasted approximately 35 minutes and was performed either in the respondent's workplace or research centers. The room guaranteed that no one at work could overhear the responses. Each interview was tape-recorded using a speakerphone. During the interview, the author/s took extensive notes, which were compared to interviews recordings in order to avoid mistakes regarding notes or transcriptions.

RESULTS & ANALYSIS

Once the questionnaire was administered to the subjects, the first step was to transcript the recordings to a word processor. Following that, the content analysis was performed. Results showed that there are two kinds of "abandonment". The most common situation is leaving not only the IT career, but also the IT sector. The second abandonment situation (mentioned in 25% of the cases) is remaining in the IT sector, but following other career (sales in all cases). By using content analysis five main categories of variables, illustrating the main drivers of career abandonment were identified (see table 1). These five categories, as shown in figure 2, included a set of 22 variables.

Table 1. Categories of Variables affecting software career abandonment

Categories of Variables	Mention Frequency
Job related variables/Job demands	80%
Career	70%
Emotional/Psychological Variables	95%
Organizational variables	65%
Environmental variables	95%

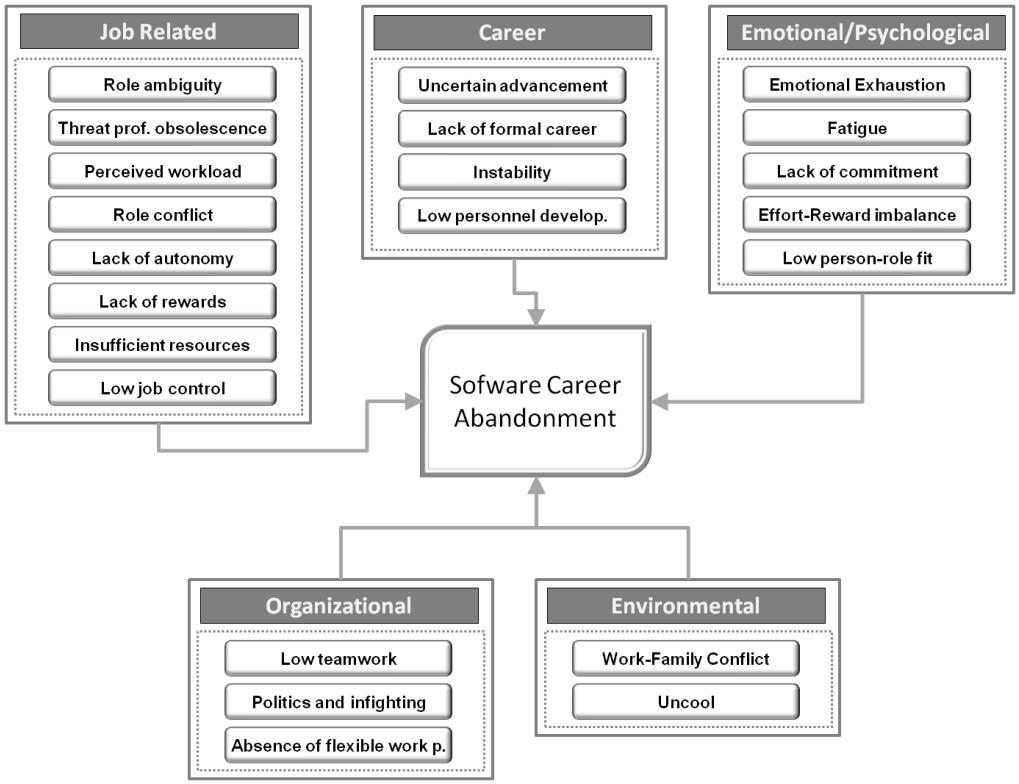

Figure 2. Variables affecting software career abandonment

To validate the results obtained in the content analysis, two independent judges (n=2) were invited. These two judges presented a deep understanding of qualitative content analysis and analyzed the variables by themselves. Previous relationship neither existed between them nor with the authors. A definition of each conceptual variable was given to them and they had to confirm whether the presence of such variables along with new variables existed. In this sense, they were told to select variables over 0.34. This decision means that variables mentioned below 0.35 are not considered relevant to the study. To measure the inter-judge agreement, the Kappa statistic by Cohen (1960; 1968) was calculated. An average kappa value equal to 0.841 was obtained, which indicated that there was a significant and high agreement ($z=6.8$, $p>0.01$). Figure 3 depicts the abandonment variables identified through content analysis.

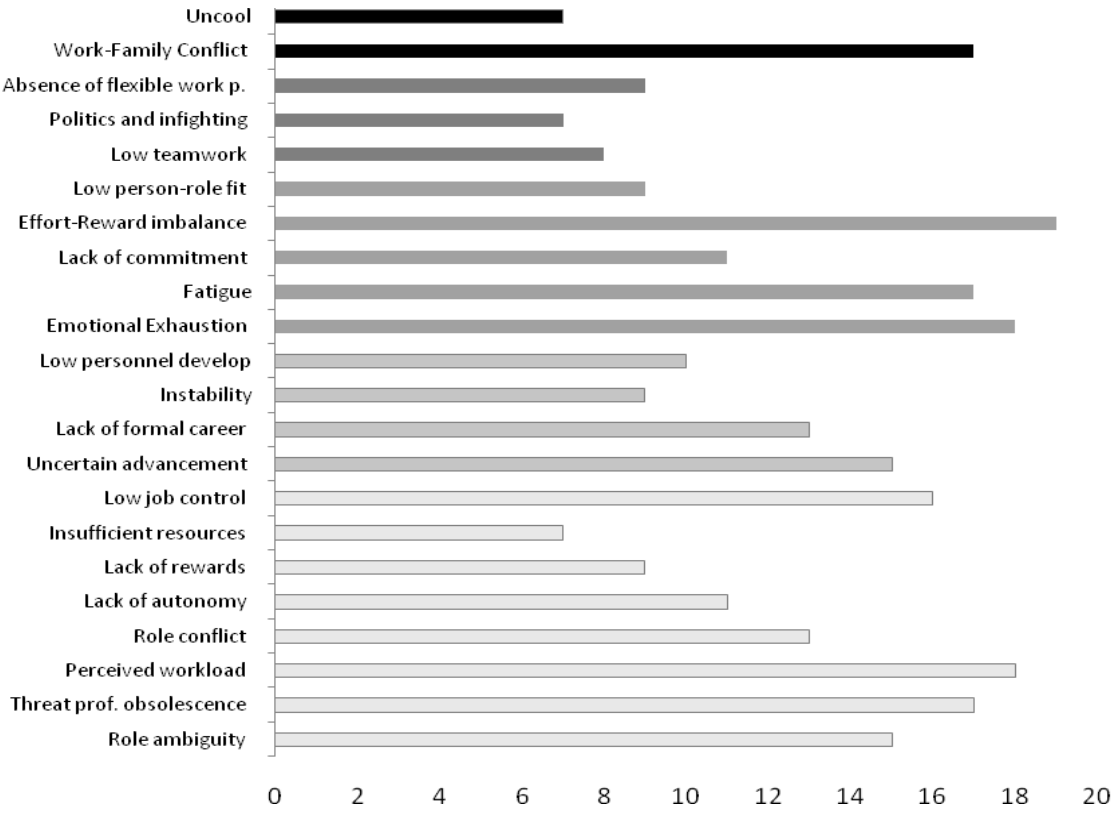

Figure 3. Frequency of abandonment variables

The variable most frequently found (in 95% of the cases was mentioned by respondents) was effort-reward imbalance. Respondents indicated that the effort and investment of energy required by the technological work is hardly rewarded. In addition, they stated that workload (90%) and fatigue (85%) are important as well as emotional exhaustion (90%), since the majority of respondents mentioned them. Also, another important variable with regard to the decision to abandon was threat of professional obsolescence (85%). This variable requires the software engineer to stay in constant updating of knowledge and skills. Professional obsolescence is one of the most important variables in the decision to leave for two reasons: the need of continuous training and learning to stay current and the lack of time and resources available to engineers because of their high levels of workload.

The above variables are mainly related to emotional variables (e.g. effort-reward imbalance, emotional exhaustion) and job-related variables (perceived workload, threat of professional obsolescence). Work-family conflict can be seen as the result of the work-family imbalance, representing a crucial

environmental variable. Among the variables that had a moderate influence on the abandonment decision were: role conflict (65%), lack of formal career (65%), lack of autonomy (55%) or lack of commitment (55%). Other variables that represented a medium-low incentive were: absence of flexible work practice (45%); low teamwork (40%); insufficient resources (35%), politics and infighting (35%) and uncool (35%). As shown, some of the less influential variables are related to aspects concerning the demands of work (e.g. insufficient resources) and organizational variables (e.g politics and infighting).

Study 2: Quantitative Study

PLANNING

The second study consisted of a survey. More specifically, the variables obtained in the first study were codified as 5-point Likert scale items. This research instrument was pretested with 10 different academics and professionals. Our primary objective was to detect inadequate wording, social desirability bias and how administrable the instrument was. The results from the pretest showed no particular bias, but some respondents had trouble understanding some items. The wording of these items was revised accordingly to improve readability and comprehension of the different questions. Through this pretest content validity was verified.

The final questionnaire (Appendix 1) was administered by electronic means (online) to a sample of practitioners with a working experience ranging from 2 to 4 years. The reason for this restriction has to do with the study's objective: To explore and analyze abandonment variables presented in young software engineers. The instrument consisted of two parts. The first section included questions related to the collection of demographic and background information of the subjects (age, gender, job and working experience), while the second section focused on the study of variables leading to career abandonment. For each variable, one question, asking to what extent a given variable leads to software career abandonment, was introduced. All questions were Likert scale. The scales presented five values ranging from 1 to 5. The description of the scales was generic, presenting the following order of values and descriptions:

0 = Strongly disagree

1 = Disagree

2 = Neither agree nor disagree

3 = Agree

4 = Strongly agree

DATA COLLECTION

The revised version of the questionnaire was transformed into a web-based questionnaire. This mean is appropriate and brings flexibility to the collection process. The authors sent personal invitations to a set of 250 subjects via email. All these subjects were selected from their personal and academic contacts. Subjects were selected from those that were working in software development projects and their working experience ranged from 2 years to 6 years. The first reminder was sent by email a week after the invitation to participate. The second reminder was sent out 20 days after the initial invitation. From the total of 250 invitations to participate, 167 subjects responded to the questionnaire. After an initial screening of the data, 19 questionnaires were discarded due to several reasons because they were incomplete or appeared not to be valid (e.g. used a fixed pattern of responses), leaving a final set of 148 valid responses, which means an effective response rate of 59%. The final sample consisted of a total of 148 subjects. Within this final sample of professionals, 115 were men and 33 were women. The average age of positive respondents was 29.3 and the average working experience of 3.9 years. This sample can be considered similar in terms of age and experience to the one presented in Study 1.

RESULTS & ANALYSIS

Table 2 shows descriptive statistics of all the 22 variables. These statistics include mean and standard deviation for each variable:

Table 2. Descriptive statistics for each abandonment variable

#	Variable	Mean	Std. Deviation
1	Role ambiguity	2.60	0.90
2	Threat professional obsolescence	2.90	0.84
3	Perceived workload	3.05	0.86
4	Role conflict	2.41	1.22
5	Lack of autonomy	1.63	0.95
6	Lack of rewards	1.58	1.11
7	Insufficient resources	1.78	0.95
8	Low job control	2.74	0.97
9	Uncertain advancement	1.80	1.18
10	Lack of formal career	1.43	1.09
11	Instability	1.36	0.98
12	Low personnel develop	1.36	1.13
13	Emotional Exhaustion	2.98	0.92
14	Fatigue	2.70	0.91
15	Lack of commitment	1.74	1.11
16	Effort-Reward imbalance	3.14	0.92
17	Low person-role fit	1.30	0.93
18	Low teamwork	2.01	1.20
19	Politics and infighting	1.31	1.22
20	Absence of flexible work p.	2.05	1.14
21	Work-Family Conflict	2.73	0.95
22	Uncool	1.32	1.27

As shown in table 2, ***effort-reward imbalance*** (3.14) and ***perceived workload*** (3.05) presented the greater means, followed by ***emotional exhaustion*** (2.98) and ***threat of professional obsolescence*** (2.90). Therefore, this second study indicated that *effort-reward imbalance* and *perceived workload* should explain career abandonment, along with *emotional exhaustion* and *Threat of professional obsolescence.*

The results of this second study are consistent with the first study regarding the relative weight assigned to each variable. In the first study, the variables mentioned above had a presence of around 80% and 90%.

In fact, the variable concerning effort-reward imbalance was the most mentioned variable in both samples.

With regard to the variables that influence the decision to leave to a lesser extent, there were also similarities between the two studies. Variables such as Politics and Infighting (1.31), Uncool (1.32) and Insufficient resources (1.78), similar to the results in Study 1 (35% of mention), presented the lower means. However, variables referring to Lack of a formal career (1.43) or Lack of Professional Commitment (1.74) were less relevant in this second study in comparison to the medium-high importance obtained in the first study (55-65%).

Finally, as in Study 1, work-related variables, psychological variables and emotional variables were the most relevant to explain career abandonment.

A bivariate correlation analysis was performed that included all variables considered in our study. As presented in Table 3, the higher and significant correlation occurred between *Perceived workload* and *Threat professional obsolescence* ($r=0.731$, $p<0.01$). This latter variable also correlates significantly with *role ambiguity* ($r=0.617$, $p<0.01$) and *Low job control* ($r=0.593$, $p<0.01$). Moreover, *Threat of professional obsolescence*, presents a medium and significant correlation *Emotional Exhaustion* ($r=0.463$, $p<0.01$). The correlation between *Perceived workload* and *Emotional Exhaustion* was medium and significant ($r=0.506$, $p<0.01$). This indicates that the perceived workload and the psychological experience of emotional exhaustion may be related. Furthermore, *Perceived workload* presented a high and significant correlation with *Low job control* ($r=0.634$, $p<0.01$). This suggests that perceived workload may be associated with job control. The significant correlations between many of job related variables indicated that an underlying construct explaining this phenomenon may exist.

The *Lack of autonomy* variable presented a high and positive correlation with *Insufficient resources* ($r=0.697$, $p<0.01$). Finally, the correlations matrix highlighted medium and high relations between different variables under job related variables category. These variables, in addition to the above, included: *role ambiguity* and *perceived workload* ($r=0.469$, $p<0.01$); *role ambiguity* and *role conflict* ($r=0.506$, $p<0.01$*); instability* and *low person-role fit* ($r=0.216$, $p<0.01$); *low person-role fit* and *politics and infighting* ($r=0.335$, $p<0.01$). These results again suggested that additional underlying constructs explaining software career abandonment may exist.

In sum, the high correlations among many of these items suggested that the use of data reduction techniques was highly appropriate. To reduce this set to a handful of meaningful constructs, a factor analysis was used. To test the appropriateness of the data set for using factor analysis, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were used. Hair et al. (1998) recommended a KMO index of >0.6 and Bartlett's $p<0.5$ as suitable for factor analysis. The rule used to determine the number of factors was eigen value greater than 1 criterion (Kaiser, 1974). A total of two factors were extracted (see figure 3).

Table 3. Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1	**0,617**	**0,469**	**0,506**	*-0,192*	0,016	-0,057	**0,403**	0,061	0,098	0,056	*0,183*	**0,296**	-0,105	-0,079	0,020	0,139	0,072	0,015	0,152	**0,224**	*-0,181*
2	**0,617**	1	**0,731**	**0,394**	-0,124	0,034	-0,037	**0,593**	0,097	-0,027	0,028	0,046	**0,463**	0,014	-0,051	-0,122	*0,162*	0,001	0,071	0,069	**0,289**	-0,059
3	**0,469**	**0,731**	1	*0,199*	-0,050	-0,033	0,040	**0,634**	0,064	-0,089	-0,080	-0,013	**0,506**	-0,049	-0,113	-0,104	0,081	0,091	-0,048	0,115	**0,349**	-0,152
4	**0,506**	**0,394**	*0,199*	1	0,014	0,061	0,026	**0,350**	0,018	-0,028	0,095	0,096	0,141	0,073	-0,046	-0,161	-0,074	0,063	0,029	-0,063	0,113	-0,013
5	*-0,192*	-0,124	-0,050	0,014	1	-0,026	**0,697**	0,041	-0,053	-0,109	**-0,222**	-0,072	0,038	0,053	-0,087	-0,119	-0,110	0,044	-0,064	0,048	0,121	0,093
6	0,016	0,034	-0,033	0,061	-0,026	1	0,020	0,023	**0,233**	**0,231**	-0,030	0,039	-0,041	-0,077	**0,263**	-0,035	-0,126	0,104	-0,064	-0,043	-0,031	**0,392**
7	-0,057	-0,037	0,040	0,026	**0,697**	0,020	1	-0,005	-0,039	0,020	**-0,235**	0,131	0,072	0,009	-0,050	**-0,235**	*-0,191*	-0,046	-0,144	0,079	0,038	0,020
8	**0,403**	**0,593**	**0,634**	**0,350**	0,041	0,023	-0,005	1	0,056	-0,041	-0,043	0,124	**0,412**	0,026	-0,103	-0,156	-0,084	0,007	0,018	0,042	**0,290**	-0,003
9	0,061	0,097	0,064	0,018	-0,053	**0,233**	-0,039	0,056	1	0,065	-0,116	-0,013	0,003	0,073	0,012	0,070	-0,144	**0,227**	0,028	0,149	-0,042	-0,022
10	0,098	-0,027	-0,089	-0,028	-0,109	**0,231**	0,020	-0,041	0,065	1	-0,042	**0,398**	-0,018	-0,146	-0,013	0,055	-0,135	0,117	-0,115	-0,065	0,052	0,049
11	0,056	0,028	-0,080	0,095	**-0,222**	-0,030	**-0,235**	-0,043	-0,116	-0,042	1	-0,154	-0,030	-0,056	*0,201*	*0,171*	**0,216**	0,004	0,140	0,125	-0,042	-0,043
12	*0,183*	0,046	-0,013	0,096	-0,072	0,039	0,131	0,124	-0,013	**0,398**	-0,154	1	0,079	0,005	-0,130	-0,017	-0,111	-0,102	-0,032	-0,082	0,002	0,024
13	**0,296**	**0,463**	**0,506**	0,141	0,038	-0,041	0,072	**0,412**	0,003	-0,018	-0,030	0,079	1	0,155	0,035	-0,053	-0,017	0,006	-0,085	0,105	**0,552**	0,064
14	-0,105	0,014	-0,049	0,073	0,053	-0,077	0,009	0,026	0,073	-0,146	-0,056	0,005	0,155	1	-0,065	-0,080	0,035	-0,042	0,158	0,080	0,056	0,059
15	-0,079	-0,051	-0,113	-0,046	-0,087	**0,263**	-0,050	-0,103	0,012	-0,013	*0,201*	-0,130	0,035	-0,065	1	0,037	0,032	-0,060	0,001	-0,006	-0,100	**0,378**
16	0,020	-0,122	-0,104	-0,161	-0,119	-0,035	**-0,235**	-0,156	0,070	0,055	*0,171*	-0,017	-0,053	-0,080	0,037	1	0,116	0,091	0,003	*0,182*	0,013	-0,033
17	0,139	*0,162*	0,081	-0,074	-0,110	-0,126	*-0,191*	-0,084	-0,144	-0,135	**0,216**	-0,111	-0,017	0,035	0,032	0,116	1	-0,008	**0,335**	0,095	0,017	-0,105
18	0,072	0,001	0,091	0,063	0,044	0,104	-0,046	0,007	**0,227**	0,117	0,004	-0,102	0,006	-0,042	-0,060	0,091	-0,008	1	0,012	*0,164*	-0,064	-0,077
19	0,015	0,071	-0,048	0,029	-0,064	-0,064	-0,144	0,018	0,028	-0,115	0,140	-0,032	-0,085	0,158	0,001	0,003	**0,335**	0,012	1	0,024	0,043	-0,129
20	0,152	0,069	0,115	-0,063	0,048	-0,043	0,079	0,042	0,149	-0,065	0,125	-0,082	0,105	0,080	-0,006	*0,182*	0,095	*0,164*	0,024	1	0,068	-0,010
21	**0,224**	**0,289**	**0,349**	0,113	0,121	-0,031	0,038	**0,290**	-0,042	0,052	-0,042	0,002	**0,552**	0,056	-0,100	0,013	0,017	-0,064	0,043	0,068	1	-0,013
22	*-0,181*	-0,059	-0,152	-0,013	0,093	**0,392**	0,020	-0,003	-0,022	0,049	-0,043	0,024	0,064	0,059	**0,378**	-0,033	-0,105	-0,077	-0,129	-0,010	-0,013	1

Bold: Correlation is significant at the 0.01 level (2-tailed).
Italics: Correlation is significant at the 0.05 level (2-tailed).

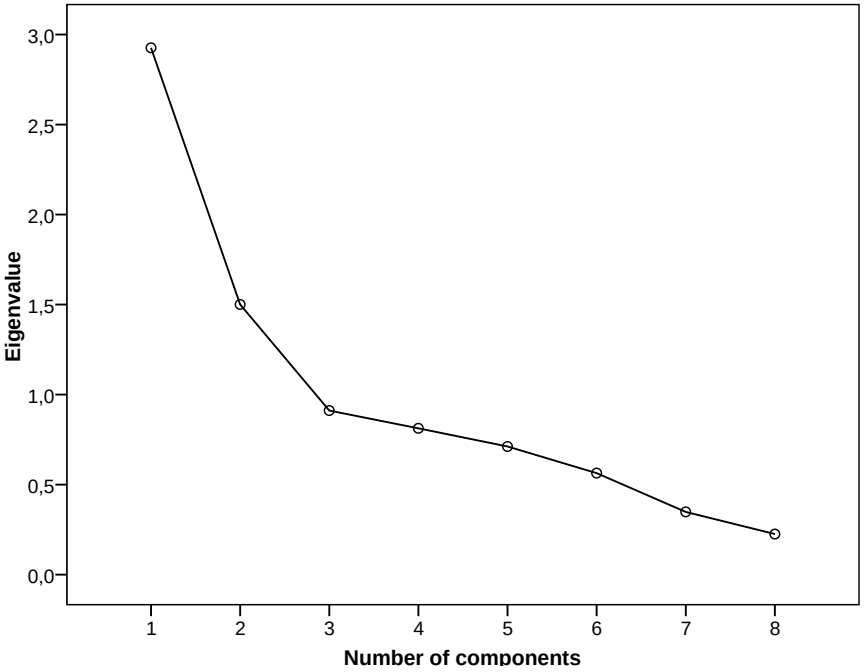

Figure 3. Scree Plot

The final results of the factorial analysis are presented in table 4. To emphasize the association of specific items with derived factors, the highest loadings of each row are given in bold. Each item loaded strongly (>0.5) on only one of the two factors which indicates high convergent validity, while all other factor loadings for these items remained below the 0.34 criteria recommended by Churchill (1979) as an indication of strong discriminant validity.

Table 4. Factor analysis

ITEM	FACTOR	
	1	2
Role ambiguity	**0.768**	0.137
Threat professional obsolescence	**0.883**	0.123
Perceived workload	**0.817**	-0.065
Role conflict	**0.684**	0.022
Low job control	**0.784**	-0.136
Instability	-0.013	**0.681**
Low person-role fit	0.060	**0.786**
Politics and infighting	0.004	**0.703**
KMO	0.717	
Barlett	0.00	
Eigen values	2.926	1.501
Variance accounted for by factor (%)	37.546	18.732

To ensure the consistency of the factors obtained, reliability analysis was carried out to eliminate items that were not strongly related to other items in the construct. For each factor, Cronbach α was above the 0.7 standard suggested by Nunnally (1978), thus supporting construct reliability (see table 5).

Table 5. Statistics for reliability and validity tests

Factor	Items	Reliability (Cronbach alpha)	Convergent validity (correlation of item with total store-item)	Discriminant validity (factor loading on single factors)
Job related	5	0.810	0.768; 0.883; 0.817; 0.584; 0.784	0.768; 0.883; 0.817; 0.684, 0.784
Perceived instability	3	0.765	0.581; 0.786; 0.703	0.681; 0.786; 0.703

Closer examination on the interpretability of these results showed that one of the resulting factors (factor 1) appeared to clearly reflect the job related category originally identified in the qualitative study, with the other (factor 2) representing the intention to abandon the career based variables causing instability. Factor 1 consisted of variables measuring purely job related variables, while factor 2 was formed of career (instability), emotional/psychological (low person-role fit) and organizational variables (politics and infighting). Considering these characteristics and given the presence of the variables instability and politics/infighting in factor 2, they were named job related factor and perceived instability factor, respectively. Therefore, the factors obtained allow us to measure the software career abandonment based on job related and perceived instability variables. A possible explanation to this finding is that the groups of variables that more account for the abandonment of the software career are job related and stability related.

Discussion

Through this study, authors confirmed that the abandonment of the software engineering career among young professionals, whose average experience is even less than five years, is a common practice and identified the variables that influence on that decision. These results are important not only for human resources management affairs, but also for the future of the profession. The study also complements previous findings reported in the literature regarding the effects of turnover.

Career abandonment can be a dramatic evolution of employee turnover, since turnover is a stable trend among IT and software workers (Carayon et al., 2006; Chang, 2010; Ghapanchi & Aurum, 2011). In fact, many of the variables found in this study have been reported in previous research devoted to IT personnel turnover. More specifically, the most relevant variables identified and related to previous research are: *perceived workload* (Carayon et al., 2006; Ghapanchi & Aurum, 2011; Moore, 2000; Paré & Tremblay, 2007), *emotional exhaustion* (Ahuja et al., 2007; Ghapanchi & Aurum, 2011; Rutner, Hardgrave & McKnight, 2008) and *threat of professional obsolescence* (Ghapanchi & Aurum, 2011; Joseph et al., 2007; Moore, 2000).

Findings indicate however that one of the leading variables identified is less common in IT personnel management literature: *effort-reward imbalance*. This variable is not presented in the literature on turnover, though it is outlined by recent reviews and reports on the subject (Ghapanchi & Aurum, 2011). The importance of effort-reward imbalance has been also previously underscored by research on fatigue and emotional distress (e.g. Takaki et al., 2005).

As reported in the literature (e.g. Siegrist, 1996; Siegrist et al., 2004), effort-rewards imbalance may be interpreted as a job situation in which the amount of personal effort expended outweighs the rewards that accrue and this is the interpretation in our study.

Another finding pointed out workload and emotional exhaustion as two of the most important variables involved in career abandonment. These variables are also presented in the literature on turnover. In fact, recent research (e.g. Kouvonen, 2005) highlights the important relationship between the two variables. Our study found a positive and significant correlation between the two variables ($r=0.506$, $p<.01$). Indeed, perceived workload is correlated with experience emotional distress and psychological fatigue. In addition, the correlation between emotional exhaustion and Low job control is medium and significant ($r=0.412$, $p<0.01$). This suggests that the perception of low job control and the emotional stress may be related as suggested by previous research (e.g. Kouvonen, 2005).

Furthermore, with regard to the correlation between emotional exhaustion and fatigue, it is low and not significant ($r=0.155$, $p>0.01$). This may be interpreted in the sense that they are professionals used to a very high level of activity. Moreover, as mentioned by them during the interviews, one thing is facing a heavy workload, but quite another is the need to tackle an unmanageable work overload.

The *Threat professional obsolescence* variable, one of the most important variables in the two conducted studies, has been also found as a relevant variable in turnover decisions (e.g. Ghapanchi & Aurum, 2011; Fu, 2011), which is in line with recent investigations on personnel turnover. Therefore, this variable seems to be involved in turnover but also in career abandonment.

Results from the qualitative study confirmed that work-family conflict or the inability to establish a proper balance between time devoted to family and work is another significant variable influencing career abandonment, which is line with recent research on turnover decisions (e.g. Ahuja et al., 2007; Grzywacz & Marks, 2000). Not in vain, the higher the workload, the less time you can devote to family.

There are also a set of variables that, although are less significant in our study, should be analyzed. As pointed out by Morello, Kyte and Gomolsky (2007) many young people find working in IT as an unattractive career, it is seen as a hard and "uncool" work. The latter variable is revealed in this paper too. This negative image is in line with the paradox between the strategic contribution of IT for businesses and the low status of the IT department (Avison, Cuthbertson, & Powell, 1999). IT professionals are usually perceived as "strangers on the train" by the rest of the organization (Day, 2007). This variable constitutes the basis for the formation of negative stereotypes (García-Crespo et al., 2008) both from a social as well as a professional perspective (García-Crespo et al., 2009). In this scenario, in which IT people perceive their work as stressful, the negative stereotype increases also their intention to abandon the software career.

The second set of variables is related to career options and skills development. The lack of sufficient maturity of the IT profession, in general, and the software engineering profession, in particular, have been highlighted in the literature since the seminal work by Ford and Gibbs (1996) to more recent efforts (e.g. Colomo-Palacios et al, 2010; McConnell, 2003; Saiedian, Bagert and Mead, 2002). This lack of maturity is presented in the aspects defined by Ford and Gibbs (1996), which mature professions (e.g. medicine, law) address in a convenient way. Thus, medicine, like IT, suffers from of the constant improvements in its techniques, tools and means, but Professional Development in medicine is more mature than in IT and practitioners are more likely to attend courses or professional updates than IT personnel. A reason for this trend may be that career development is better defined and communicated in mature professions than in IT and software. In this sense, explicit career *pathing* and professional development (including well-linked promotion criteria, skills inventory management…) are seen as key issues in managing software personnel (McConnell, 2003).

Other finding from the qualitative study points to the Lack of Commitment as a reason to abandon the software career. There is a vast amount of work analyzing organizational commitment as a variable

neutralizing or reducing turnover decisions (e.g. Fu, 2011). In addition, since the nineties, literature has been reporting that other kinds of commitments, like affective commitment, act as a buffer against stress and its antecedents for IT professionals (King & Sethi, 1997). Therefore, in future research, it would be interesting to explore in more detail the influence of commitment -in all its forms (affective, normative, continue ...)- on abandonment decisions.

The qualitative study identified five categories (job related variables, career, emotional/psychological, organizational, environmental), including 22 variables. The quantitative study codified all these variables as 5-point Likert scale items, analyzed them independently and conducted a factor analysis to explore the subjacent dimensions/factors. A total of two factors were extracted. The first factor clearly reflects the job related category originally identified in the qualitative study, while the second factor was formed of variables from three categories identified in the qualitative study: career (instability), emotional/psychological (low person-role fit) and organizational variables (politics and infighting). Based on these characteristics, they were named job related factor and perceived instability factor, respectively. Thus comparing results from both studies, it seems that job job related and stability related variables from career, emotional/psychological and organizational perspectives contribute to software career abandonment.

CONCLUSIONS AND FUTURE WORK

The main purpose of our study is to find out why most of IT professionals leave the software development career before even having five years of experience. Although these professionals are subject to high levels of turnover, the objective here is not to investigate turnover but the reasons why they decide to leave the IT career forever. There is a vast amount of literature devoted to study the variables involved in turnover and many of these variables coincide with the variables found in our research*: threat professional obsolescence*; *perceived workload, low job control, etc.* However, turnover decisions are not of the same nature as abandonment decisions. Our results suggest that the emotional, psychological experience of stress and job-family conflict variables have a greater effect on abandonment than one obtained from these variables in previous turnover studies. Therefore, personal and emotional variables are critical to understand the decision to abandon the technical career by IT professionals (who do not exceed five years of experience). Also, the factor analysis identified to main dimensions (factors) that lead the most to the software career abandonment: job related and perceived instability factors.

In addition, our results suggest that important variables in turnover decisions such as (*Lack of) rewards, insufficient resources or Instability* have not the same influence on abandonment decisions. Abandonment decisions are hard decisions and in such decisions the goals of psychological and family wellbeing seem to exceed career and professional goals.

We acknowledge that the present work also has some limitations. Regarding methodological aspects of our study, we should point out that to investigate within this area is not easy. Approaching professionals who have decided to abandon their careers and ask them about the reasons is not easy. In fact, in future works, we will further investigate on the psychological and emotional consequences of IT career abandonment. Therefore, the reliability of the results would have been higher if we had had a much larger sample of professionals who had left the software career (Study 1), but it is also not easy to get a large sample of professionals who want to evaluate some hypothetical reasons that lead them to abandon the software career. Nonetheless, the study benefited from a large sample in our Study 2. Also, the two factors obtained in Study 2 accounted for around 60% of the variance which constitutes another limitation of the paper. In future, research should further validate and extend the categories of variables affecting software career abandonment.

In any case, despite the limitations of our study, it provides a first approach to understand the phenomenon of IT career abandonment. Technological activity is quite demanding. This means that many professionals stay in technology business but they prefer to avoid performing these technological roles and seek alternatives in other areas of business such as sales as soon as they can.

These results make us reflect on people management, specifically on the management and retention of talent within the IT sector. Talent managers have not provided answers on the "turnover culture" (Moore & Burke, 2002). Are we moving towards an unstoppable "IT abandonment culture"? What would it mean for business and the industry? It is difficult for an organization to see how a valuable resource leaves the company to work for the competition, but it is even more unpleasant to see how a professional leaves the industry, which will no longer benefit from his/her talent.

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Appendix 1. Quantitative Questionnaire.

Age:	
Gender:	
Job Role:	
Working experience:	

Please read carefully the phrases below. Indicate, using the 5-point scale, how far you agree with each phrase. *0 = Strongly disagree; 1 = Disagree; 2 = Neither agree nor disagree; 3 = Agree; 4 = Strongly agree.*

1. The role ambiguity is a variable that leads to the career abandonment.

0 1 2 3 4

2. The Threat professional obsolescence is a variable that leads to the career abandonment.

0 1 2 3 4

3. The Perceived workload is a variable that leads to the career abandonment

0 1 2 3 4

4. The Role conflict is a variable that leads to the career abandonment

0 1 2 3 4

5. The Lack of autonomy is a variable that leads to the career abandonment.

0 1 2 3 4

6. The Lack of rewards is a variable that leads to the career abandonment

0 1 2 3 4

7. The Insufficient resources is a variable that leads to the career abandonment

0 1 2 3 4

8. The Low job control is a variable that leads to the career abandonment

0 1 2 3 4

9. The Uncertain advancement is a variable that leads to the career abandonment

0 1 2 3 4

10. The Lack of formal career is a variable that leads to the career abandonment

0 1 2 3 4

11. The Instability is a variable that leads to the career abandonment

0 1 2 3 4

12. The Low personnel develop is a variable that leads to the career abandonment

0 1 2 3 4

13. The Emotional Exhaustion is a variable that leads to the career abandonment

0 1 2 3 4

14. The Fatigue is a variable that leads to the career abandonment.

0 1 2 3 4

15. The Lack of commitment is a variable that leads to the career abandonment.

0 1 2 3 4

16. The Effort-Reward imbalance is a variable that leads to the career abandonment.

0 1 2 3 4

17. The Low person-role fit is a variable that leads to the career abandonment.

0 1 2 3 4

18. The Low teamwork is a variable that leads to the career abandonment.

0 1 2 3 4

19. The Politics and infighting is a variable that leads to the career abandonment.

0 1 2 3 4

20. The Absence of flexible work is a variable that leads to the career abandonment.

0 1 2 3 4

21. The Work-Family Conflict is a variable that leads to the career abandonment.

0 1 2 3 4

22. The consideration that IT work is Uncool is a variable that leads to the career abandonment.

0 1 2 3 4