Information technology implementation styles and their relation with workers' subjective well-being

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Abstract *The aim of this article is to analyse the information technology implementation styles in companies and their relation with different indicators of shop floor workers' subjective well-being. The sample is composed of 11 tile production companies and 285 workers. Results from cluster analysis show two main implementation styles, so-called "continuous implementation style" and "first-time implementation style". Besides, results from MANOVA show significant differences in workers' cognitive well-being (i.e. job satisfaction, role ambiguity, and positive attitudes toward information technology) but no significant differences in workers' affective well-being (i.e. job related enthusiasm, job related comfort and general mental health) due to information technology implementation styles. Limitations and future research are discussed.*

The implementation of information technology (IT) is a common feature of organisational contexts nowadays. Most organisations are making use of such kind of technology as a way of renewing their production capability (Wall and Davis, 1992), and increasing their competitiveness and flexibility (Smith, 1986; Torkzadeh and Angulo, 1992). Basically, information technology implementation takes place as a "goal-direct project" (Korunka *et al.*, 1993). It includes a set of tasks such as setting the agenda for the IT introduction project, remedying the problems derived from the new technological system (Prieto *et al.*, 1997), or countering organisational conflicts (Korunka *et al.*, 1993). The style of IT implementation means the particular way in which that set of tasks is carried out in the organisations, i.e. the "pace" of implementation (radical vs evolutionary), the "planning" level (structured vs unstructured), or the "objectives" of implementation (productivity vs quality) (Carrero *et al.*, 2000; Gopala-Krishnan and Damanpour, 1994; Korunka *et al.*, 1993; King and Anderson, 1995).

The most classic approach to differentiate implementation styles is the "technology vs end-users" one (Blacker and Brown, 1986). The technology style

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implies a planned and rational strategy centred on technological considerations, with a relative exclusion of wider psychosocial and organisational concerns. The end-users style implies explicit consideration of the experiences of end-users as well as the wider organisational impacts and opportunities. These styles also differ in the objectives of innovation, the strategies used to introduce the technology in the workplace, and in the effects of information technology implementation on organisations, groups and individuals. The technological style had received many criticisms due to the under-estimation of the wider human and organizational issues, and for failing to act upon them (Bolden *et al.*, 1997). But in fact technology style predominates in comparison with those reflecting a joint socio-technical emphasis (Clegg *et al.*, 1994; Symon and Clegg, 1991).

There are recommendations for organising implementation such as the management commitment and the end-user involvement (Wastell and Sewards, 1995), the organisation of the project (Korunka *et al.*, 1993), the planning (Korunka *et al.*, 1997a), the participation of employees (Korunka *et al.*, 1993; Korunka *et al.*, 1997a; Korunka *et al.*, 1997b), and training and supervision (Korunka *et al.*, 1997a; Korunka *et al.*, 1997b). For instance, the employees' participation and involvement in the implementation process and training courses have positive effects on subjective well-being of end-users (Korunka *et al.*, 1993; Korunka and Vitouch, 1999; Llorens *et al.*, 2003). It seems that organisations differ in the particular style of implementing that technology, but also individuals at work differ in their feelings and reactions toward that implementation (Korunka *et al.*, 1995, 1997a, b; Prieto *et al.*, 1997; Salanova and Schaufeli, 2000; Salanova *et al.*, 2002). Workers are the end users of technology and their feelings and well-being regarding this technology seems crucial in order to guarantee the success of the information technology implementation in organisations.

Subjective well-being at work can be considered as one specific measure of mental health at work (Warr, 1987). According to Diener (2000, p. 34), subjective well-being refers to "people's evaluations of their lives – evaluations that are both affective and cognitive". Generally speaking, subjective well-being focuses on people's own evaluations of their lives, in broader judgements about their lives as a whole; but also about domains such as work. So far, subjective well-being at work refers to people's evaluations of their work – both in affective and cognitive terms. Research in a job level of analysis shows that types of technology exposure (i.e. computer training, frequency of usage, technology experience) are influencing on different indicators of subjective well-being at work (Chua *et al.*, 1999; Korunka and Vitouch, 1999; Majchrzak and Borys, 1998; Rousseau *et al.*, 1998; Salanova and Schaufeli, 2000; Salanova *et al.*, 2000). Paradoxically, despite of the relevance of the influence of IT implementation on workers' well-being, there is not much research about it. Besides, a further problem derived from this field of research is that it mainly consists of single and qualitative case studies. The studies

developed by Korunka *et al.* (1993, 1995) and Wastell and Cooper (1996) have shown some exceptions. For instance, the technology style has been linked to a significant increase in psychosomatic complaints and a decrease in job satisfaction (Korunka *et al.*, 1993, 1995). Further, Wastell and Cooper (1996) showed that the end-users style was related with lower strain and higher quality service than that focused on the technology.

Given these gaps in research, we examine different IT implementation styles, putting special attention on the process of classification of the organisations according their predominant IT implementation style. Besides, we evaluate the relationships between IT implementation styles and workers' subjective well-being (i.e. affective and cognitive outcomes).

Method

Participants and procedure

Twenty tile production companies which had information technology implanted were selected. A phone call to the company manager was made, asking them to participate in our extensive study. Managers of 11 companies were willing to participate. Then, technology project managers were interviewed in their offices for 30-45 minutes. Two investigators from the research team conducted each general interview about IT in the firm, with one person questioning and the other recording the answers. This procedure, which has been successful in other studies (see Korunka *et al.*, 1993, 1995), was used to enhance the objectivity of the statements. Later on, these interviews were written up to facilitate their analysis. After the interview, the project managers were asked to select a sample of their employees (target group) whose are using IT in their jobs. A wide battery of instruments about "experiences at work" designed by the WONT-research team (work, organization and new technology) was distributed to this sample and an envelope was included. The participants were asked to return the questionnaires to the research team in the sealed envelope. After deleted missing cases, 285 questionnaires from the 327 returned were used in this study. Participants were 71.4 per cent men and 28.6 per cent women; 51.3 per cent had primary school education, 32.3 per cent secondary school education, and 16.4 per cent had a university degree. The 67.6 per cent worked on the manufacturing production line, 14.1 per cent in laboratory jobs, 6.6 per cent in technical maintenance, 7.5 per cent in clerical jobs, 3.8 per cent were sales representatives, and 5 per cent were employed in other jobs. The average age was 33 years and 1 month (SD = 8.51).

Measures

Information technology implementation styles. It was analysed from the "Guide on IT implementation style" developed in the present work. The guide had four main sections:

(1) General characteristics of the introduction of information technology.

(2) Innovation set-up or planning.

(3) Participation in the implementation process.
(4) Training for information technology.

In the next section the way in which it was developed is explained[1].

Workers' subjective well-being

Affective outcomes. We measured job-related enthusiasm and comfort, and general mental health. Job related enthusiasm and comfort were measured using an adapted Spanish version of job related well-being by Warr (1990). The final version had 11 items (six and five respectively) according previous results by Cifre and Salanova (2002) where one item was deleted. The Cronbach's alphas were $\alpha = 0.86$ for job related enthusiasm, and $\alpha = 0.72$ for job-related comfort. Finally, general mental health was measured by the Spanish version of the GHQ-12-items (General health questionnaire, Goldberg, 1972, 1978; Spanish version by Cifre and Salanova, 2000). Cronbach's alpha was $\alpha = 0.98$.

Cognitive outcomes. We measured organizational commitment, job satisfaction, role ambiguity, and attitudes toward technology. Organizational commitment was measured using a Spanish version by Cook and Wall (1980). It is composed of nine items. Cronbach's alpha was $\alpha = 0.73$. Job satisfaction was measured by an adapted version (11 items) of the Cuestionario General de Satisfacción en Organizaciones Laborales, S10/12 (General questionnaire of satisfaction in work organisations)(Meliá and Peiró, 1989), which is measuring cognitive satisfaction more than affective satisfaction. The internal consistency was measured by the Cronbach's alpha ($\alpha = 0.91$). Attitudes towards IT was self-constructed (WONT, 1996), with two scales: technology cognitive evaluation ($\alpha = 0.81$) and consequences of technology use on the worker ($\alpha = 0.73$).

Results

Developing the guide: "IT implementation style"

In order to develop that guide, we followed a similar process used in the research by Bolden *et al.* (1997).

Stage 1. Reviewing literature. The literature reviewed included key-term searches on styles of information technology implementations, models and processes. Resources such as PSYCLIT and current contents were used. The main objective in this stage was to identify the key aspects that the implementation style guide should include, according to the literature. With this purpose, we reviewed theoretical approaches to the technological implementation processes. The general technological innovation interviews carried out by the research team were analysed in order to provide additional information not contemplated in the literature.

Stage 2. Categorising key implementation processes. The preliminary guide. The outcome of this literature reviewed was a preliminary interview guide for evaluating technology implementation process, which included the key styles

of implementation. Next, this preliminary guide was sent to different experts, asking them for their suggestions. The outcome of these suggestions served as a basis for the development of the final version of a structured implementation style guide. This preliminary guide was a structured guide of implementation styles consisting mostly of multiple-choice questions. To exclude subjective answers, questions and possible answers were formulated as objectively as possible. However, in this stage there was still the option of including suggestions, such as reading the empirical interviews. The collection of data was about:

- implementation characteristics;
- implementation set-up or planning;
- user participation in the implementation; and
- training related to the implementation.

Stage 3. Contrasting with empirical data. The next stage was filling in this preliminary guide by the members of the research team following the empirical interviews already made in the companies about technological innovation. Then, the scores from each company in every item were agreed by the researchers, providing an individual score for each company. We used the "constant comparative method" (Glaser and Strauss, 1967). The systematic use of this method allowed us to differentiate several pieces of information leading to a conceptual saturation of the information generated from the empirical data. We were contrasting the information among experts in order to get a consensual final result.

This contrast with empirical data allowed the researchers to improve of the first preliminary guide. In this way, some items with problems were eliminated or re-formulated. The result of this third stage was a second version of the guide, as well as the scores of each company in the entire guide.

Stage 4. Classifying the styles of implementation. The empirical guide. Having identified all these key aspects of the styles of implementation, efforts were made to condense the list by clustering companies with similar types of implementation styles (see next section).

Cluster analysis

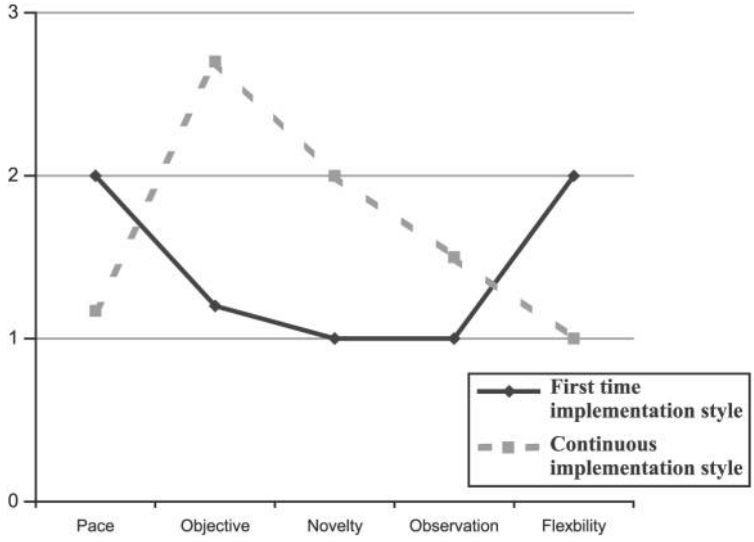
Using hierarchical cluster analysis and discriminant analysis, we identified two clusters. We called the clusters "first-time implementation style" and "continuous implementations style". Some further items were eliminated and the final version of the guide was made. Only several items related to implementation characteristics and implementation set-up or planning were included in the equation. These variables were:

- Implementation characteristics: (1) pace of implementation; (2) scope of the implementation; (3) objective of the innovation; (4) origin of the implementation; (5) novelty of the innovation.

- Implementation set-up or planning: (6) pilot studies carried out; (7) observation of others firms' innovations; (8) design teams to developing the implementation; (9) identification of future users; (10) flexibility of the innovation process; (11) end users evaluation; (12) prevision of implementation consequences; (13) formal planning of the implementation.

From all these variables, only five showed discrimination between clusters, that is, the pace of implementation ($F(1,10) = 6,02; p < 0.05$), the objective ($F(1,10) = 12,77; p < 0.01$) and the novelty ($F(1,10) = 4,09; p < 0.05$) of the implementation, the fact of observing the technology from the competence ($F(1,10) = 4,09; p < 0.05$), and the possible flexibility during the implementation process ($F(1,10) = 12,27; p < 0.01$). The Wilks' Lambda of the discriminant function was $0.015(\chi^2(10) = 19; p < 0.05)$. Results are shown in Figure 1.

The five companies belonging to first time implementation style are firms whose technological implementation has a high pace, although this technological innovation represent a novelty only for the company (not for



Note:

Pace of implementation: (1) Low (incremental); (2) Medium; (3) High (revolutionary or radical)

Objective of the innovation: (1) Improving production; (2) Improving quality; (3) Both

Novelty of the innovation: (1) New for the firm; (2) New for the sector; (3) Both

Observation of others firms' innovations: (1) Yes; (2) No

Flexibility of the innovation process: (1) Flexible; (2) Medium; (3) Rigid

Figure 1.
Information technology implementation styles

the sector). The objective of this innovation is only improving the productivity. As far as implementation planning is concerned, these companies always check the technology that the rest of the companies (the competition) have. Finally, the flexibility related to the planned implementation process is medium (medially open to changes).

On the other hand, the six companies belonging to the continuous implementation style have an implementation pace much slower, as they are used to them. It seems that they use the technology implementation not only to survive, but also to achieve higher standards. It is shown by the fact that the objective of their technological implementations is not only to increase the productivity but also to reach a high level of quality in their final products. Related to this, the novelty of their innovations are both for the company itself and for the sector in which it is involved. Regarding planning, only 50 per cent check out the technology that the rest of the companies are using. Finally, and according to their experiences, the flexibility of the implementation process is really high.

IT implementation styles and workers' subjective well-being

Multivariate analysis of variance (MANOVAs) were conducted in order to check the influence of the style of implementation over the workers' subjective well-being. The factor variable was IT implementation styles with two values: "first time implementation" composed of 93 participants, and "continuous implementation" composed of 192 participants. The dependent variables were different indicators of subjective well-being. According to Diener (2000), we used as affective as cognitive variables like indicators of subjective well-being. The former are job related enthusiasm, job related comfort and general mental health. The cognitive variables are cognitive job satisfaction, organizational commitment, attitudes toward information technology and role ambiguity. The zero-order bivariate correlations among these variables are showed in Table I.

The results of MANOVA tests (Wilks lambda) show a significant multivariate test for cognitive variables ($F(5, 163) = 6.610, p < 0.001$) (see Table II) but not for affective variables ($F(3, 154) = 1.150$, ns). The univariate analysis of variance (ANOVAs) for each cognitive variable show a significant test for the two dimensions of attitudes toward information technology: technology cognitive evaluation ($F(1, 167) = 3.045, p < 0.05$) and consequences of technology use on the worker ($F(1, 167) = 21.211, p < 0.001$) and for role ambiguity ($F(1, 167) = 3.569, p < 0.05$). The differences are close to the conventional test of 0.05 for job satisfaction ($F(1, 167) = 2.494, p = 0.07$) and for organizational commitment ($F(1, 167) = 2.237, p = 0.09$). Workers from companies with a first time implementation style, show more positive attitudes toward information technology (both evaluation and consequences), more role ambiguity, more job satisfaction and feel more commitment with the company than workers from companies with a continuous implementation style.

Variable	Range	*M*	DT	α	2	3	4	5	6	7	8
1. Job related enthusiasm	1-6	4.07	0.90	0.86	0.68**	0.56**	0.46**	0.43**	0.01	−0.03	0.17**
2. Job related comfort	1-6	4.75	0.78	0.72	–	0.51**	0.44**	0.43**	0.14*	0.09	0.17**
3. General mental health	1-4	3.27	0.26	0.98	–	–	0.26*	0.21**	0.03	−0.03	0.04
4. Job satisfaction	1-7	3.85	1.06	0.91	–	–	–	0.54**	0.03	−0.03	0.26**
5. Organizational commitment	1-7	5.01	0.94	0.73	–	–	–	–	0.11	0.01	0.22**
6. Attitudes toward IT (evaluation)	1-5	3.89	0.53	0.81	–	–	–	–	–	0.67**	−0.01
7. Attitudes toward IT (consequences)	1-5	3.76	0.69	0.73	–	–	–	–	–	–	−0.01
8. Role ambiguity	1-5	3.69	0.78	0.73	–	–	–	–	–	–	–

Note: $^{**}p < 0.01$; $^{*}p < 0.05$

Table I.
Range, means, standard deviations, internal consistencies (Cronbach's α) and zero order correlations ($N = 285$)

Dependent variables	*M* (first implementation)	*M* (continuous implementation)	df	*F*
Job satisfaction	3.98	3.73	1	2.49*
IT evaluation	3.95	3.80	1	3.04**
IT consequences	4.03	3.54	1	21.12***
Org. commitment	5.12	4.94	1	2.23*
Role ambiguity	3.82	3.59	1	3.56*

Note: $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < .001$; Wilks lambda is used for multivariate test

Table II.
MANOVA: information technology implementation styles and worker "cognitive" subjective well-being

Discussion

The objective of this study was to analyse the information technology implementation styles and its relation with different indicators of workers' subjective well-being (i.e. cognitive and affective outcomes). Moreover, we developed a guide to assess the main implementation style in each company following a strict four-stage process using qualitative and quantitative methodology. The review of literature showed that there are few scientific studies that had tried reach this objective (see Korunka and Vitouch, 1999). So far, this goal was relevant not only from a scientific point of view, but also from an applied one. The results of the present study provided evidence for the existence of two different IT implementation styles termed: "continuous implementation style" and "first time implementation style". The former style is predominant in companies whose technological implementation pace is much slower, as they are used to them. They use the technology implementation not only to survive but also to achieve higher standards. They want to reach a high

level of quality in their final products. Therefore, the novelty of their innovations is both for the company itself and for the sector in which they are involved. They have planned the process and are usually the top in innovations within the sector, with a high flexibility in the process of implementation. The first time implementation style is predominant in companies where IT implementation has a high pace, not high innovativeness, with a main objective to innovate: improving the productivity, looking out to innovate, and with a rigid process of innovation. These two kinds of implementation styles have been also identified by Korunka and his team, as their research projects focus ranged from those firms with first implementations to those with continuos implementations. The result concerning the validity and reliability of the instrument shows that it presents a good index of both. Obviously, not all the sets of variables included in the guide presented discriminant power, but then these were deleted in order to describe the final styles of IT implementation.

Previous research has shown two main styles of IT implementation: technology vs end users styles (see Blacker and Brown, 1986). We found unexpected and counterintuitive results. In our study, just the main strategies that differentiate between both styles (i.e. participation and training of end-users) had not discriminant power. However, we observed that these strategies had been used in almost all the companies under study. Therefore, we can conclude that, independently of whether the company is classified in the continuous implementation or first time implementation cluster, they use strategies to introduce information technology centred in end users style (i.e. participation in the introduction process and training for end users). Our results have an important theoretical contribution because they are innovative. We only found one study where similar styles were found (Korunka *et al.*, 1997a, b).

Moreover, our results provide empirical evidence for the development of a guide to identify styles of IT implementation based on "action-research". Thus, we followed a set of structured steps (according to Bolden *et al.*, 1997) in order to elaborate the final guide: reviewing literature, categorising key implementation processes with the first preliminary guide, contrasting with empirical data, and finally classifying the styles of implementation with the final empirical guide. Besides, we used cluster analysis in order to identify different styles. So far, we were continuously in contact with the companies, doing interviews, seeking more information. In sum, working on the ground in order to contrast theoretical and practical information to elaborate the final guide. Moreover, our results are innovative because we used mixed methodology taking into account both qualitative, based on grounded theory (Glaser and Strauss, 1967) (i.e. interviews, documented information, constant comparison), and quantitative (i.e. self-report questionnaires). With both methodologies we were able to obtain relevant information from the companies. Besides this, we used cross-organisational case studies or multicase studies in order to contrast the information between companies.

Another specific objective of this study was to explore the relationship between the style of IT implementation used and workers' subjective well-being. Previous research had found that a technology style has been linked to a significant increase in psychosomatic complaints and a decrease in job satisfaction, commitment and other indicators of mental health (Korunka *et al.*, 1995). However, there is not much research about the relationship between the implementation styles obtained in this study (i.e. first and continuous implementations) and subjective well-being. In the study of Korunka *et al.* (1995) where these styles were found, no relationships with indicators of subjective well-being were studied. Our results are also innovative in this sense. Workers belonging to both types of implementation styles showed no significant differences on affective outcomes of subjective well-being, such as job related enthusiasm and comfort and general mental health. However, these workers showed significant differences on cognitive outcomes of subjective well-being. So far, workers belonging to companies with a first time implementation style showed more positive attitudes toward information technology, more satisfaction with their jobs, more commitment with the company, but experiencing more role ambiguity. In general terms, these workers have positive cognitions regarding information technology, their jobs and their companies, what seems functional in order that information technology will have a successful implantation. Role ambiguity is higher in these workers but also it is expected that when technology is implanted at work from the first time, there will be confusion and ambiguity about what kind of tasks, procedures, cues, and goals workers must reach in this new work scenario. Research on job stress has found that role ambiguity is a job demand positive related with strain at work. However, in our study, the positively bivariate correlation between role ambiguity and the other cognitive and affective variables such as job related enthusiasm and comfort, job satisfaction and organizational commitment show that workers belonging to companies where information technology is implemented for the first time perceive ambiguity as a positive job demand. Perhaps in this specific case, ambiguity is related with challenge instead of a stressful situation. Future studies must to clarify these relationships in order to clarify the deep meaning of these relationships.

In sum, our study shows that information technology implementation styles are related more with cognitive aspects of subjective well-being than with affective ones. In other studies, we found similar results using no organizational types of technology exposure (such as implementation styles) but job types of technology exposure (such as frequency and time of usage, technology training and technology experience). In Salanova and Schaufeli (2000), we found that frequency and time of technology usage have an indirect influence on burnout, mediated by appraisal of technology experience. Moreover, this influence is only on the cognitive dimensions of burnout, such as

cynicism and perceived efficacy, but not on affective dimension of burnout (i.e. emotional exhaustion). Besides, in Salanova *et al.* (2000) we found that computer self-efficacy played a moderating role between computer training and burnout (with more influence on cynicism again). And in Salanova *et al.* (2002) we only found a three way interaction effect of job demands (quantitative overload), job control and computer self-efficacy on the cognitive dimension of burnout, i.e. cynicism. Also Anthony *et al.* (2000), in a study on technophobia, found that it is more related with cognitive aspects that affective ones. They found that although neuroticism correlates with computer anxiety, it correlates even more highly with negative computer thoughts. They concluded that the importance of cognitions may indicate that technophobia has more to do with cognitive outcomes (i.e. self-consciousness, self-confidence and self-efficacy) than with affective ones (i.e. anxiety).

The limitations of our study clearly must also be noted. First, the study was conducted with companies in a specific production sector. Although it seems useful to develop specific tools to fit the real needs of the companies, the results of the present study need to be replicated in a wider group of companies and other sectors to establish the external validity of the results. Second, since the current study is cross-sectional in nature, no causal inferences can be made. Therefore, future longitudinal research should corroborate our positive findings concerning the cognitive well-being of workers belonging to companies with a first time implementation style.

In brief, the results of this study provide evidence for the existence of two clearly different styles of IT implementation in the companies, with a useful guide and process to audit each company's own style. Besides, this study shows a stronger relationship between IT implementation styles and cognitive well-being at work (i.e. organisational commitment, job satisfaction, role ambiguity and attitudes toward information technology).

Note

1. The "guide" is available under request to the first author.

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