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Supply Chain Quality Management in Education

Abstract

Purpose – This paper introduces and discusses the concept of supply chain quality management (SCQM) in education. It then analyses a particular country case study in light of the concept, presenting empirical evidence of the challenges and good practices relating to it.

Design/methodology/approach – The empirical work is based on a country case study which includes data on four higher education institutions and nine secondary schools. Data is obtained from national and institutional documents, as well as from individual and panel interviews. We have used content analysis for both data and interview transcripts.

Findings – We find that whereas we can think of education systems as supply chains, there are important challenges to SCQM in education, namely regarding information sharing, trust, integration, and leadership. Conversely, we have found some ad-hoc good practice which could be developed into more systematic SCQM practice.

Research limitations/implications (if applicable) – The study covers only a single case study, and a part of the education supply chain.

Practical implications (if applicable) – The work could inform policy makers as well as institutional leaders on practices that would improve the performance of the education supply chain.

Social Implications (if applicable) – Education is a very important activity sector with a strong impact on the well-being of societies. Gains in education performance resulting from better SCQM in education would thus impact us all.

Originality/value – The article offers a novel way of looking at the education system through the lenses of SCQM; if implemented it could significantly improve the performance of education systems.

Keywords Quality, Supply chain management, Integration, Education, Practice, Challenges, Hurdles, Empirical evidence

Paper type Research paper

Introduction

Assuring the quality of teaching and learning activities is paramount for institutions involved in education, in an increasingly competitive national and international environment. Schools and higher education institutions help nurture knowledge societies and economies through the 'production' of people with the knowledge, competences and skills that enable societal development.

An interesting line of enquiry is to conceptualise education systems as a supply chain, as, in common with other supply chains, they consist of several entities directly involved in upstream and downstream flows (Mentzer *et al.*, 2001). In this case, these flows are services and information running from the source (pupils, students, families, feeder schools, etc.) to customer (receiving schools, universities, labour market, society, etc.), where pupils and students are, at different stages, inputs, co-producers, and outputs.

Supply chain management (SCM), understood as the coordination and integration of all the activities of a supply chain into a seamless process (Lummus and Vokurka, 1999), has been shown to help improve the performance of the supply chain (Stevens, 1989; Stewart, 1997; Spekman *et al.*, 1998). Moreover, and more recently, energy has been focused on the synergies between quality management and supply chain management leading to improved supply chain performance (Flynn and Flynn, 2005; Kannan and Tan, 2005; Robinson and Malhotra, 2005; Foster Jr., 2008; Kaynak and Hartley, 2008; Kuei *et al.*, 2011). Most of these developments have occurred in the manufacturing sector, and to a lesser extent in wholesaling and retailing (Tan, 2001), as the downstream part of the manufacturing supply chain. However, little evidence exists of their use in the service sector, and indeed education, where we would argue that many of these developments are equally applicable and beneficial.

A service (education included) is an operation that transforms inputs into outputs, like any other operation (Slack *et al.*, 2012). Services represent around 70% of employment in advanced economies, and the government sector, including education, totals more than manufacturing and agriculture combined (The Economist, 2014). In light of this, we would argue that it is time that supply chain quality management theory and practice was developed in government and service sectors as well. Education is of particular interest as evidence has shown that despite increasing investment and gain in the volume of people educated, there are questions regarding the effectiveness of the sector, the increasing difficulty of governing complex education systems (Mason, 2008; Snyder, 2013) and their alignment with labour market needs (Mourshed *et al.*, 2012).

As such, in this paper we intend to discuss supply chain quality management in education. We follow the lead of Robinson and Malhotra (2005), who call for the empirical study of quality topics in the context of external supply chains to help improve our understanding and expand our knowledge of quality perspectives in SCQM. We especially focus on the link between secondary and higher education and how their development of quality assurance mechanisms for teaching and learning help support the integration of the education supply chain. Our goal is to identify the challenges facing the alignment of higher and secondary education and the extent to which these could be overcome by implementing a set of quality assurance practices, which explicitly refer to the relationship between schools and universities, in a 'supplier' and 'customer' partnership perspective. To illustrate this we use a country case study (Portugal), using empirical data collected from four universities and nine secondary schools in their vicinity.

Literature review

Several authors have noted the impact of supply chain integration on performance. Flynn *et al.* (2010) find that internal and customer integration were more strongly related to performance improvements than supplier integration. Frohlich and Westbrook (2001), on the other hand, find consistent evidence that the widest degree of arc of integration with both suppliers and customers had the strongest association with performance improvement. The results of Li *et al.* (2006) indicate that higher levels of SCM practice can lead to enhanced competitive advantage and improved organizational performance. Tan (2002) reaches the same general conclusion: that all of the significant supply chain management practices positively impact performance. It is worth noting, however, that all of these works refer to the manufacturing industry.

There is arguably no unique and unequivocal definition of quality management (QM), however, it is generally accepted to represent a management approach consisting of a coherent set of principles, supported by a set of practices and techniques (Dean and Bowen, 1994), designed to improve organisational performance. Both the ISO 9001 standard and the EFQM Excellence Model have established such principles (or core concepts), which are usually used as the rationale to develop quality management systems within organisations, including education and higher education (Rosa and Amaral, 2007; Campatelli *et al.*, 2011; Rosa *et al.*, 2012). One of such principles relates to the need for customer focus (activities performed must add value to the customer), while another has to do with the promotion of mutually beneficial relationships with suppliers. Both of them reflect the idea that an organisation is

not a closed entity, alone in the world, but rather that it is in contact with several other people and organisations and that it needs to establish links with both suppliers and customers in order to effectively manage and improve its quality. Sousa and Voss (2002) have also pointed out that “in the present business environment, the attention of businesses is increasingly being directed away from within-firm boundaries towards the management of supply chains and networks of firms (...) This general trend poses a major challenge for the future of the field of QM”.

To address this diagnosis, SCQM has been proposed, which seeks to integrate both SCM and QM. This paper adopts the definition of SCQM of Foster Jr. (2008): “a systems-based approach to performance improvement that leverages opportunities created by upstream and downstream linkages with suppliers and customers”. He goes on to set up a research agenda in the field. Kaynak and Hartley (2008) concur that more research is needed to understand how to most effectively integrate quality processes with various members across the supply chain. Even more recently, Foster Jr *et al.* (2011) have argued that SCQM is still in the definitional stage, and that rigorous studies of SCQM practices and tools have yet to emerge.

Despite the infancy of the theme, there is a set of studies that have shown their relevance. Flynn and Flynn (2005) have argued that “organisations with stronger quality management practices achieved better supply chain performance”. Kuei *et al.* (2011) especially stress the importance of supplier relationship quality, and Stank *et al.* (2001) the relationship between collaboration and performance. Kannan and Tan (2005)’s results also indicate that a commitment to quality and an understanding of supply chain dynamics have the greatest effect on performance. Kuei *et al.* (2001)’s results further suggest that organisational performance could be enhanced through improved supply chain quality management, and Lin *et al.* (2005)’s data showed that QM practices could be used to improve the management of supply chain networks.

Consequently, if we develop better quality management practices we improve supply chain performance, which as has been argued above is clearly needed in education systems.

An important point made by Mentzer *et al.* (2001) is that SCM does not make sense for just one entity, as it depends on the involvement of all the links in the chain. Despite the fact that these concepts have been mainly used in manufacturing, the authors help explain them using an analogy from public management (the management of a river), which shows how they could indeed apply to public services, such as education.

In higher education, the idea of establishing close and mutually beneficial relationships between universities and their suppliers and customers, in order to manage and improve quality, is still rather uncommon. This may be due to terminology – customer and supplier are not concepts usually used in this organisational context, mainly because of their connotation with the business world – but also for historical reasons, as for a long time universities have been ‘ivory towers’, separated from the rest of the world. Either way, the fact is that in the contemporary world universities are not alone anymore and they increasingly need to establish links and relationships with different types of stakeholders, including their ‘customers’ and ‘suppliers’ (Sarrico and Melo, 2012). According to an OECD report on tertiary education for the knowledge society, one of the biggest challenges tertiary education is facing nowadays is precisely the need to “step out of its traditional ivory tower and outreach towards its environment” (Santiago *et al.*, 2008, p. 99).

The aforementioned OECD report states that “linkages need to be built and/or strengthened (...) also up and downstream with upper secondary education and the economic world” (Santiago *et al.*, 2008, p. 99), and that “close linkages with upper secondary education – which feeds students into tertiary systems (...) are important to ensure that changing demands for tertiary education are accommodated and that all students are given the opportunity to thrive” (Santiago *et al.*, 2008, p. 100). The basic idea underlying the claim for such linkages is that the expansion of tertiary systems has led to a high level of students who fail to complete tertiary programmes. This is not only due to students failing to meet tertiary education standards, but also because they may have chosen the wrong subject or found an attractive employment opportunity before completing their degree. Whatever the reasons, student drop-out at degree level is a sign of internal inefficiency and low quality. Four mechanisms are then proposed to help improve articulation between secondary and tertiary education for successful tertiary study, namely (Santiago *et al.*, 2008):

- improving student information and career guidance at upper secondary level, so that students’ enrolment decisions and subject choices better reflect their needs, expectations and abilities;
- enhancing the alignment of upper secondary and tertiary curricula, so that upper secondary students are well-equipped to succeed in their tertiary education studies;
- provision by tertiary education institutions of foundation, preparatory, bridging, repair and remedial programmes for specific groups of upper secondary education. The idea

underlying these programmes is to assist specific student groups in developing the necessary skills for success in tertiary study;

- promoting tracks from vocational secondary education to tertiary education, eliminating educational dead-ends in upper secondary vocational education.

All the proposed mechanisms reflect at least some elements of partnership relationships proposed by Slack and Lewis (2011, p. 161), such as joint learning, long-term expectations, trust, joint coordination activities, joint problem solving, and communication, as part of a successful supply strategy.

Access seems to be a cornerstone of the relationship between higher and secondary education, due to its role as the main 'point' of contact between the two sectors. Universities should then pay special attention to the definition of institutional policies on access. The problem with this seems to be the fact that access constitutes a "poorly defined term in the context of European higher education systems and subject to considerable variation in the way it is articulated through national legislation and institutional policy and practice" (Owen *et al.*, 2013). In a recent study of Portuguese institutional policies on access, Tavares *et al.* (2014) refer that although "institutions develop efforts in order to assure and improve quality at the level of access, such efforts seem to be in a very early stage and not driven by clearly formulated policies or strategies". The same, we argue, may equally be true for the definition and implementation of universities' strategies on the wider relationship with secondary education.

According to Kohoutek (2009), one of the major achievements of the Bologna process in terms of quality assurance is the drafting and adoption of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). This has added new momentum to research in the quality assurance policy domain, although so far the corresponding research has centred much more on the national (mainly quality assurance agencies) than on the institutional level. And this is despite the fact that Part 1 of the ESG includes a set of standards and guidelines specifically aimed at university strategy, policy and procedures for the continuous assurance and enhancement of quality (ENQA, 2009). Interestingly this part of the standards includes references to universities' external stakeholders and the need to take their views into consideration when developing and implementing internal quality assurance systems. This topic appears in two different places: ESG 1.1 - *Policy and procedures for quality assurance*, states that the policy and procedures for quality assurance "should also include a role for students and other stakeholders", while ESG1.2 – *Approval, monitoring and periodic*

review of programmes and awards, states that the “quality assurance of programmes and awards are expected to include: (...) regular feedback from employers, labour market representatives and other relevant organisations”.

Despite the relevance given by the ESG to the role of external stakeholders, there is no explicit reference in Part 1 of the ESG to the secondary education level, which is rather odd since secondary schools are by far the most relevant ‘suppliers’ of students to universities. Providing education of the highest level and properly assuring the quality of such education surely implies that universities reflect on outputs of the secondary education sector, namely when formulating their access strategies or recruiting and training teaching staff for undergraduate study. On the other hand, secondary education must also be concerned with the assurance of its own quality, namely through the development of mechanisms and procedures that assure adequate preparation of their pupils to access higher education, meaning that it prepares them to take maximum advantage of the higher education opportunity offered to them.

For these reasons, it is interesting to conceptualise education as a supply chain and to empirically investigate the supply chain quality management practices in education. This study is particularly interested in giving a contribution to the following questions raised by Foster Jr. (2008): How do we assure service quality in the supply chain? How is quality managed in the context of the supply chain? How is management integrated with customers and suppliers to improve supply chain performance? How do these changing relationships influence quality results in organisations? What is the role of supplier development in improving product and service performance?

The Portuguese case

As already referred in this paper, access works as the main ‘point of contact’ between secondary and higher education, since secondary schools are the most important suppliers of ‘inputs’ to universities. In Portugal access to higher education is a matter of national policy and centrally regulated. The majority of students accesses public higher education through a centralised placement system accounting for students’ preferences and their grades in secondary education and national exams. Universities do not have much leeway to implement their own institutional policies on access. Furthermore previous work indicates that there are no clear policies and procedures for quality assurance regarding access (Tavares *et al.*, 2014), although universities are developing some strategies and initiatives to attract students other than those from the national competition. Such target groups include mature students, foreign students and students holding post-secondary education diplomas. However, these initiatives

seem to be more evident in those institutions which are less able to attract traditional students in the national competition.

Regarding quality assurance, both educational systems are nowadays subject to national quality assessment systems, under which universities and schools have to develop their own internal mechanisms, namely an internal quality assurance system in the case of universities and a process of self-assessment in the case of secondary schools.

The current higher education quality system was initiated in 2009 and complies with the ESG for Quality Assurance (ENQA, 2006). This system is characterised by the assessment and accreditation of study programmes and institutions under the responsibility of an independent body for its coordination – the Higher Education Assessment and Accreditation Agency (A3ES). Accreditation assumes a preponderant role as a way to assure that study programmes and institutions reach minimum standards leading to their official recognition. Institutions are required to develop a quality assurance policy for their programmes, a culture of quality and quality assurance of their activities and a strategy for the continuous improvement of their quality. Most Portuguese universities currently have or are developing their own internal quality assurance systems (Rosa and Sarrico, 2012). Some of which have already been certified, following institutional audits by A3ES.

During the 1990s the school sector, including secondary education, saw several quality assessment programmes developed and implemented in a rather erratic manner. Subsequently, a law was passed in 2002 requiring schools to perform their own self-assessment, which should then be followed by an external assessment. For several years this law was little more than a rhetoric device, and it was only in 2006 that a Working Group was created by the Ministry of Education tasked with defining a model for schools' external assessment. In 2007/08, a programme for externally assessing schools was launched, under the responsibility of the General Inspectorate for Education (IGE). By the end of 2010/2011 all mainland Portuguese schools had been assessed (from pre-school to secondary school) and a new cycle was initiated in 2011/12, following a new model (an improved version of the first model). But despite the fact that since 2002 schools have been obliged by law to perform their own self-assessment, including a self-assessment report for the external assessment system currently in place, both data from the IGE and from a recent study on this topic show that self-regulation and improvement capacity are still lacking in most Portuguese schools (Sarrico *et al.*, 2012). This is particularly serious when we look at the results obtained by Portuguese students – performance in both national exams, required for entry into higher education, and

in international programmes, such as PISA, is invariably considered below the desirable level (OECD, 2014).

As secondary education precedes higher education, serving as the main supplier of students, and since both need to develop internal mechanisms to assure the quality of teaching and learning, it seems relevant to understand if these two sectors are working together to produce the best possible graduates in an integrated way, or if they are simply two worlds apart.

Data and Methods

This study makes use of data collected as part of a larger project identifying barriers in promoting European Standards and Guidelines for Quality Assurance in higher education.

Our country case study includes a set of embedded units of analysis: four universities and nine public secondary schools. The chosen institutions include two traditional research universities and two universities of applied sciences. In order to provide a diversified sample for the empirical research, they also differ in terms of the number of students and location. The selected secondary schools were from the same locality as the universities included in the sample, allowing a study of how proximity influences the relationships between higher and secondary education. The sample also tried to include two different types of schools: those that mainly cater to pupils who wish to pursue higher education studies (regular scientific-humanistic education) and those who mostly cater to pupils wishing to enter the labour market directly (vocational-professional education). This approach was designed to detect potential differences in the schools' relationship with higher education due to their educational profile.

The analysis was developed in two steps. Firstly, we started by analysing national legal texts and policy documents issued at higher education institutional level referring to different aspects associated with the relationship between the secondary and higher education sectors, namely regarding quality issues. Secondly, interviews were conducted with 20 people covering different groups of actors in each of the universities and the 9 secondary school heads. All interviews were transcribed for content analysis.

In each of the four selected universities the interviews targeted members of the central management and administration and members of the faculties/schools. The first group comprised the Rector/President (or, in substitution, a vice-rector/vice-president, or a pro-rector) and the representative of the Quality Assurance structure (or, in substitution, a

representative of the Senate, of the structure responsible for study programmes, or for the student support services). The second group included the Dean (or equivalent) the representative of the Quality Assurance structure (at unit level) and a study programme director. As a result of methodological considerations, selections were made concerning, first, the scientific areas and, second, the study programmes to which the members of the faculties/schools belonged. As a result, two major distinct scientific areas were selected, namely engineering and arts. In addition two study programmes (undergraduate programmes only), from each area, were selected in each institution.

The same interview protocol was used for both educational levels, as the intention was to collect the opinions of secondary school heads on the same topics discussed with university actors. The interview questions were the following:

- 1) In what way do national policies promote alignment between secondary and higher education?
- 2) In what way does the institutional policy on quality take into account issues of progression from secondary education to higher education?
- 3) To what extent are secondary school pupils prepared to take maximum advantage of the higher education opportunity offered to them?
- 4) Are quality assurance requirements for secondary education aligned with those for higher education?
- 5) Are there formal processes in which the secondary and higher education sectors communicate with each other, either at institutional level or national level?
- 6) In what ways might more efficient alignment between secondary and higher education be achieved?

Findings

In this section, we offer a synthesis of the main results obtained across the four universities and the nine secondary schools, based on all the collected data (both from legal and institutional documents and interviews). While document analysis has been the main source of information connected to the existence of a formal relationship between secondary and higher education, the content analysis of the interview transcripts allowed for a better understanding of their reality and effectiveness. The findings are presented with the same structure as the interview protocol, with an additional heading for emergent challenges and good practices, derived from the content analysis. Due to the small sample, when quoting from interviewees we take due care to preserve anonymity, as promised to respondents.

National policies on aligning secondary and higher education

The most relevant legal documents (laws and decree-laws) for education in Portugal were analysed to uncover the formal relationships between secondary and higher education. The conclusion is that these documents make little reference to such a relationship; this means that so far it is not possible to discern an effective national policy promoting an alignment between secondary and higher education. Crucially, neither the Comprehensive Law on the Education System (Law 46/86) nor the Legal Framework of Higher Education Institutions (Law 62/2007) explicitly refer to the need for establishing a relationship between the two sectors. In fact, the only reference made to a link between secondary and higher education appears in the Comprehensive Law on the Education System, where students' final grades at secondary education level are stipulated as the selection criteria for applicants who wish to access higher education.

Use of a national competition to access higher education was criticised by interviewees from three universities on the grounds that it does not allow institutions to really choose their students. In a way, institutions receive the students the system 'gives' them, who may not be exactly the most suited for the subjects they will have to study in higher education. In fact, final secondary education exams are not designed by the universities, who are limited to specifying which national exams students have to pass to access each undergraduate programme. Universities do not make specific exams or hold interviews for student selection. Furthermore some interviewees (including one university school head and one member of a university's rector's office) mentioned that secondary school grades and even national exam classifications are inflated and are not good predictors of student success in higher education.

Anyhow, one of the institutions, which has more difficulties attracting students from the national competition track, voiced the opinion that student selection should not be a university responsibility. Instead, universities should get their students from the national competition, even if they are not that well prepared, and then work to improve their knowledge and competences.

Neither of the laws that establish the quality review systems in the two education sectors make any substantial reference to a link between them. Only the Legal Framework for the Evaluation of Higher Education (Law 38/2007) touches on the subject, where interdisciplinary, interdepartmental and inter-institutional cooperation are referred to as a parameter for

assessing universities. It is possible to assume that the inter-institutional cooperation may also include a liaison with secondary education.

References in national legislation to the links between secondary and higher education are mostly confined to two decree-laws. One decree-law (74/2004) establishes the principles guiding curricular organisation and management, as well as learning assessment in secondary education; this does include the need for articulation with higher education. The other decree-law (88/2006) establishes the post-secondary education diplomas (CETs), which are short (two-year) post-secondary programmes with a strong professional and vocational orientation that do not confer a higher education degree. This decree-law establishes that if these programmes are not offered by universities then a protocol must be established between the offering institution (typically a secondary school) and a university. It may be considered, then, that these programmes also intend to promote a smooth transition from secondary to higher education, through a period of further education that is closer to higher rather than secondary education.

Institutional policy on quality and progression from secondary to higher education

The statutes of the universities included in the sample do not explicitly mention any formal link or relationship between secondary and higher education, nor was it possible to identify any clear and formal concerns with the progression from secondary to higher education in the institutions' quality policy documents. However, the institutional actors interviewed provided different examples of institutional arrangements to assist students in their first year in higher education. The perceived increase in the number of students needing support has raised concerns in institutions about academic quality. As a result, institutions have put in place different student support mechanisms aimed at improving teaching and learning quality.

In all universities there are special programmes for first-year students with difficulties in mathematics and sometimes also in physics, chemistry and/or the Portuguese language. Mathematics is a special concern for engineering degree programmes as many students coming from secondary education do not possess the necessary level of competence in the subject to successfully complete the mathematics courses in their degree programmes. These special arrangements can take the form of classes prior to the beginning of the semester, meant to bring all students' skills and knowledge up to the same standard before the formal classes begin, or of classes and tutorials during the semester, meant to aid students that have more difficulties accompanying the programme.

One university also promotes “bridging courses” in mathematics and also plans to offer them in the future in chemistry, biology, physics and the Portuguese language. These courses are aimed at secondary school leavers but are taught by higher education lecturers; the basic idea here being to prepare students for higher education.

Furthermore, three of the universities studied make efforts to identify first-year students’ level of knowledge and competence in different subjects. This information then helps them to adapt the contents of at least some of the first and second year curricular units to reflect the students’ academic background.

Two universities of applied sciences also commented how CETs can help smooth the transition between secondary and higher education. CET students become acclimatised and familiarised with higher education, although they are not strictly within the higher education system. When these students conclude the CET and decide to enter higher education, they are better prepared to take advantage of the opportunity. Furthermore, staff teaching CETs and undergraduate programmes in the same area often establish a dialogue (sometimes they are even the same teachers), discussing how to articulate both programmes and how to use a common language and approach to the curricular contents. One school head referred to the CETs as having the students with the profile most aligned with the polytechnic of their region.

Finally, it is worth noticing that secondary school heads made little reference to universities’ arrangements to assist students in their first year. In fact, when they did talk about it, most of them admitted to not having any knowledge about this matter.

Preparation of secondary school pupils for higher education

University actors were equally ignorant when asked about the special mechanisms that exist in secondary schools to prepare their students to take maximum advantage of higher education. They essentially referred to the generally low academic quality of first-year students, as well as the fact that they tended to be more immature than some years ago; not being sufficiently autonomous to take their own decisions (as supposedly promoted by the Bologna process). This somehow deficient background was emphasized as a possible reason for significant failure rates in higher education. At least one university school head also tended to agree that students’ academic level was lower than desirable. He mentioned that this most probably happened because the contents of the secondary curriculum were not as demanding as they should be, and/or were not the most appropriate for higher education. As a result, students

entering higher education lacked adequate academic preparation to assure their academic success.

Nevertheless, there were also university actors who had a more positive view of the students' background when accessing higher education. A comment from the engineering school of one university of applied sciences stated that in recent years students seemed to be more focused; they seemed to know better how to benefit from higher education. And this institution's President even mentioned that students entering higher education have more knowledge than often said. However, sometimes the knowledge they arrive with is not the knowledge they need to succeed in their study programmes.

This same idea is conveyed by one school head when alerting to the mismatch between the curricular contents of both educational sectors. He mentions that sometimes students go to higher education and repeat what they have learned in secondary school (especially when they enter universities of applied sciences), while at other times they lack contents needed in higher education that should have been learned in secondary school (especially in mathematics). Another head has mentioned that there are very good students and that secondary education is not as basic as sometimes higher education likes to think it is.

Several national competitions, for instance in chemistry and mathematics, and the national science dissemination programme, promoted by universities, were mentioned by one university interviewee as having a significant impact on secondary school pupils' preparation (if secondary schools are willing to take the opportunity to participate).

When asked about what preparation schools give their students to take maximum advantage of higher education, school heads immediately referred to the emphasis secondary schools are putting on students' scientific and academic preparation. They tended to agree that this was the most important preparation students should have to succeed in higher education. As one school head mentioned, "the better the students finish secondary education, in academic terms, the better prepared they will be to succeed in higher education".

To improve students' academic preparation, schools tend to organise extra support classes for students during the year, as well as special intensive classes to help prepare them for the final exams. Some of these classes are open to all students but it is up to them to decide to attend or not, while in other cases teachers identify the students who need to attend the classes. Furthermore, in one school it was mentioned that the head made an explicit effort to constitute a team of teachers for secondary education, selected for their ability to offer a solid

academic preparation to students. And in another school, the stability of teaching staff and an emphasis on pedagogical continuity during the three years of secondary education were mentioned as important points influencing students' academic preparation. An investment in practical laboratory classes, both in sciences and physics, were other mechanisms mentioned by a school head to improve students' academic preparation. Finally, in one rather problematic school, where students' have quite low expectations of entering higher education, the best students were allocated classes with the best teachers, in order to try to improve student success and chances of entering higher education.

Almost all school heads mentioned the career guidance services in their schools and highlighted their role in students' transition from secondary to higher education. These services, which in the majority of cases have a psychologist, offer students an overview of the programmes available in different universities and their entry requirements; they also advise students on how to select the best option. In one school, students are alerted to the fact that secondary and higher education are two different worlds and that frequently the specificities of the degree programme they will be enrolled in will only be visible in the second or third year of studies, since the first year in many universities is the same for a whole range of different study programmes.

Finally, some school heads mentioned the existence of extra-curricular activities (sometimes outside of the school) as a way to prepare students for their life in society, as citizens. One head specifically mentioned his school's concern with preparing students to work autonomously and to invest in their own education.

Alignment of quality assurance requirements

As previously noted, both educational sectors are subject to similar external review processes, at least in the way they are organised. Both systems are based on a self-assessment report by the institution under review, a visit to the institution by a panel of external reviewers, and an external review report which is made public. Crucially, both systems require institutions to develop internal mechanisms to assure the quality of teaching and learning.

From the interviews conducted, universities and secondary schools seem to be worlds apart given their knowledge of each other's quality assurance systems. In universities the exception is academics who participate in the assessment panels for the schools' external assessment programme (these panels are composed of two Inspectors from the General Inspectorate for Education and a lay member, who is usually an academic).

Anyhow, when interviewees do not declare their ignorance of the others educational sector's quality assurance system, they tend to state that both systems are quite independent and/or that there is no alignment between the two. The president of one university of applied sciences mentioned that schools and universities are quite different realities, which obviously have to lead to different quality assurance mechanisms (even if there are common concerns in terms of pedagogic quality). For example, schools do not have pedagogic autonomy to decide their curricula or the contents of the different courses; neither do they have to be concerned with the fit between curricular contents and competences, nor do they have to periodically update curricular contents. Schools are more concerned with the grades their students achieve because that determines their positions in the rankings. One school head mentioned that schools' external assessment looks at students' academic results but does not consider the integration of secondary and higher education. And a third mentioned that while students in higher education have a voice (they answer satisfaction surveys), this is not possible in schools because they are too immature and they would probably assess friendlier teachers better.

However, one school head did admit knowing little about the higher education quality assurance system, but all the same believed it should not be that different from the secondary school system: "It will also be about processes, results, leadership, and service provision". Another school head pointed out that universities and schools have similar organisational structures and that both review systems are not that different either.

Formal processes of communication

The documents analysed and the interviews undertaken clearly showed the absence of formal processes, either at national or institutional level, allowing the secondary and higher education sectors to communicate with each other. As a result, institutions are ignorant of what happens on the other side of the fence; a rather uncooperative situation given that a significant number of students move directly from one sector to the other each year.

Anyway, when this communication does happen (and the majority of interviewees said it does not happen as frequently as it should) the processes are always informal and very much dependent on the good will of both sides' teachers and managers.

A recent change brought both sectors under the same Ministry (Ministry of Education and Science), however interviewees do not see any formal communication processes at national level between the two sectors. Reforms are made in each sector independently and ignoring the repercussions that may occur in the other (an example is the Bologna process).

Two national forums were cited as possible spaces for this communication to happen: the National Council of Education (where there are representatives – counsellors – from the two sectors) and the Council of Schools (a forum which represents school heads). At regional level, mention was made of the Municipal Council of Education, where representatives of different educational levels are also present and work together. Nevertheless, these three forums have their own agendas and so far they have no mandate to improve articulation between secondary and higher education. This may explain why these three bodies have said little specific regarding this articulation, at least as understood by the interviewees.

At institutional level the only formal process of communication between the two educational sectors referred to by the interviewees is the presence of university representatives in the schools' general councils that have decided to co-opt them. The remaining existing processes are considered to be informal ad-hoc ones.

It is interesting to note that at least one school mentioned that the university of applied sciences in the same city had a rather passive attitude towards it. This is rather odd since current demographics mean that Portuguese universities of applied sciences, even public ones, are struggling to attract new students and risk having to close degree programmes.

Nevertheless, as one interviewee pointed out, in the past universities did not care much about secondary schools; they would simply receive their pupils for further education. Nowadays, the shortage of higher education candidates has forced universities to change attitude and they are “starting to look more carefully at secondary schools, trying to open themselves up and establish partnerships with these schools. Universities are coming more and more to schools, showcasing themselves, promoting competitions, especially addressed at secondary school pupils, trying to create links between potential applicants and the institution in order to attract them”.

Some interviewees mentioned that the current situation (namely the economic crisis facing the country) may, paradoxically, lead to an improvement in communication between secondary and higher education. Universities increasingly need to attract students from secondary education, while secondary schools show growing concern with presenting students with several possibilities to continue their studies. So a closer link between universities and schools in the same region may be an option to pursue in the future, as going to a local university is certainly cheaper.

Achieving more effective alignment between secondary and higher education

Almost all interviewees mentioned that more alignment between the sectors should be encouraged, helping to improve both teaching and learning quality and the preparation of students and future graduates.

One school head mentioned that there is a gap between the sectors, where there should be a continuum. Universities should be the ones more interested in this continuum, because in a way secondary schools finish their job where universities are just about to start. They should take the initiative and discuss with secondary schools ways to improve students' preparation for higher education. Nevertheless, another school head stated that universities are doing their best to promote this articulation and that there is not much more they can do in this regard. It is not that easy to foster an articulation between the two sectors because each university is a different reality and preparing students for one is not necessarily the same as preparing them for another.

Asking how to achieve a better alignment proved a difficult question to answer, but most interviewees ended up saying that the Ministry of Education and Science should be the entity to formally promote it, driving the two educational sectors' communication. Since now there is only one Ministry responsible for both sectors (before the two sectors were under different ministries), it may be easier to work on this issue. Namely, curricular contents need more coordination (here some interviewees highlighted a misalignment between secondary and higher education in the core disciplines, leading to gaps and repetition). Two school heads suggested that a ministerial working group could be set up to promote articulation between the two sectors – especially at curricular level – and to plan, at least for the medium term, the contents that should be taught in secondary education to adequately prepare students for higher education.

Other forms of alignment mentioned included seminars in schools given by university teachers (from the region); a change in the timing of universities' open day, from the 3rd term to the 2nd term of the academic year (because at the end of the year students are absorbed with final exams, and less willing to participate in other activities); the participation of Portuguese language secondary school teachers in the CETs offered by the region's higher education institution; encouraging a debate on this topic both in the National Council of Education and in the Council of Schools; universities hosting activities especially aimed at secondary education students; motivating school teachers to study for master's and doctoral degrees (because

when they are enrolled in these programmes they are in permanent contact with universities); appreciation of school teachers' work in supervising universities' teacher trainees; creation of a forum where secondary and higher education teachers could communicate and discuss issues relating to student transition between the two educational sectors; and the increased participation of university representatives in school general councils.

Identification of challenges and good practice

From all the data collected and analysed for the Portuguese case, we have attempted to identify certain major barriers to the effective alignment between secondary and higher education, as well as a set of good practices both universities and secondary schools are developing to promote it.

Until quite recently secondary and higher education were under different ministries, potentially worsening the gap between them. As a result, this may explain the absence of national legislation or regulations, or at least explain why more has not been done to promote cooperation between both sectors – one of the main barriers identified at national level. It may also have contributed to the lack of a formal structure or decision-making body responsible for implementing formal mechanisms of communication between the two sectors.

The secondary education curriculum is decided nationally and cannot be changed at school level, even if schools want to prepare some of their students for specific higher education programmes. Furthermore, a misalignment in the curricular contents of core disciplines seems to exist between secondary and higher education. Enhancing curriculum alignment is one of the mechanisms the OECD supports to improve the link between secondary and higher education (Santiago *et al.*, 2008), something which Portugal has yet to take heed of.

At institutional level, it is worth mentioning that universities' institutional policies are not unduly concerned with the quality and progression of students from secondary to higher education, which leads us to think that at least for now the principle of establishing mutual beneficial relationships with suppliers is not implemented in Portuguese universities. This may of course endanger an adequate implementation of internal quality assurance systems.

In terms of institutional good practice, we were able to identify mechanisms that reflect the proposals put forward by the OECD, which would strengthen partnership relationships between the sectors – namely arrangements at university level to overcome the knowledge and competence deficiencies some first year students exhibit; the efforts made by secondary

schools to improve students' academic level, despite the aforementioned misalignment of curricula; and the existence of career guidance services at secondary schools helping students to choose the higher education study programme most suited to their skills and competences. Other practices that are being developed include visits by universities to schools as well as visits by schools and their students to universities; internships within universities' teacher training programmes; the presence of universities' representatives in schools' general councils; and articulation in the design of CETs.

Concluding remarks

It seems that the current relationship between schools and universities is indeed two worlds apart and shows few elements of the partnership relationships proposed by Slack and Lewis (2011) to develop a supply strategy. As one school head put it, the current feeling is that schools and universities are "in different countries, in different realities, in different universes". Or as an Arts university school head mentioned "they [at secondary schools] need to know what their students come to do here and we [at universities] need to know what they are doing there, so we can build bridges". This is certainly a barrier to quality improvement and to the fabric of a more developed society, since pupils from secondary schools will be the students in higher education. This very important "supplier-customer" relationship should be carefully integrated and developed, in order to improve each other's quality.

It has been shown that the education sector in general has supply chain integration problems, but we would also argue that despite having quite developed models for quality assurance they are still mostly intra-organisational in nature. Developing models of SCQM in education could thus benefit supply chain integration and improve its performance.

Some steps have been taken, at least in higher education, with the Bologna process, the creation of a European Higher Education Area and the development of the European Standards and Guidelines for Quality Assurance developed by ENQA. While still very much biased towards intra-organisational quality, some of these standards already implicitly propose the development of relationships with external stakeholders in order to enhance quality of provision.

Most of the literature on SC, SCM and SCQM is still firmly rooted in the manufacturing paradigm, although that is not the case in the QM literature, with several models being developed explicitly to address the specificities of the service sector (Ghobadian *et al.*, 1994; Seth *et al.*, 2005). The education sector as well has developed models based on the QM

literature, with a longer tradition in higher education (ENQA, 2009) and a more recent tradition in education (EIPA, 2013). Thus, one of the recommendations of this study is to develop these models further to include concepts of SCQM.

SC practice seldom resembles the theoretical ideal: there is a tension between SCM's potential for improving performance and the difficulty of collaboration (Fawcett and Magnan, 2002). And quite early on Lambert *et al.* (1998) recognised that it was very difficult to implement SCM beyond immediate links, and noted that the importance of corporate culture and its compatibility across supply chains could not be underestimated (Lambert and Cooper, 2000). Our study can relate to these challenges even for immediate links in the supply chain.

In fact findings from Zhou and Benton Jr (2007) show that effective information sharing is critical in achieving good supply chain performance. Our study implies that this critical element is sadly lacking. Sharing of information in education, at least in state education, should not be a problem due to the non-commercial nature of the sector. As a public service there are standards regarding transparency, accountability and publication of information requirements. These are in fact enshrined in two standards of the ESG. The information is there, the willingness to use it may not be, as traditionally the competitive impetus that is present in the product-oriented sectors of manufacturing and retailing is not present here. Furthermore, there is evidence that trust, and thus propensity for information sharing and collaboration is equally problematic in education (Burns and Cerna, 2014).

The issue of trust is part of a wider concept, that of governance. This gives credence to Ho and Au (2002)'s assertion that context is a paramount element in studying supply chains, in addition to the more common investigation of the more direct relationship between practices and performance. This fact was made visible in our study, where issues of governance, especially at national level, were often a hindrance to supply chain quality management practices, which then have an impact on performance. Curiously, it has been argued that governance models at the supra-national level, as is the case of the open method of coordination at European level (Gornitzka and Stensaker, 2014), can be an effective way of governing complex systems such as education. It would be beneficial to transpose such a method to the national level (Wilkoszewski and Sundby, 2014).

One interesting avenue for further study will be to investigate if industry-wide standards such as the ESG (ENQA, 2009) and CAF Education (EIPA, 2013) will be for the education sector what

standards such as ISO 9001 (Robinson and Malhotra, 2005) and SCOR (Stewart, 1997) have been for the manufacturing industry, i.e. a stepping stone towards SCQM.

Ours was an exploratory study in a rather poorly defined area – supply chain quality management, in an under-researched sector – education. Consequently, for further research we intend to develop a conceptual model, which would be the basis for hypotheses formulation, and empirical analysis, using survey methods with a representative sample of institutions.

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