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Innovation in legal services: the practices that influence ideation and codification activities

Jane Bourke[1*] Stephen Roper[2], and James H Love[3]

[1] Enterprise Research Centre and Department of Economics, Cork University Business School, University College Cork, Ireland.
jane.bourke@ucc.ie
*Corresponding Author

[2] Enterprise Research Centre and Warwick Business School, University of Warwick, Coventry, CV4 7AL, UK.
stephen.roper@wbs.ac.uk

[3] Enterprise Research Centre and Leeds University Business School, University of Leeds
Leeds LS2 9JT, UK.
J.H.Love@leeds.ac.uk

Abstract:
This study examines how firms' innovation practices affect ideation and knowledge codification. Building on previous studies of service innovation, we develop a hierarchic framework comprising firms' innovation 'activities' and related 'practices'. Using survey data on UK legal services firms, we then identify the individual practices that contribute to successful ideation and codification. Our study contributes to our understanding of how a structured and organised approach to innovation benefits professional services firms. Beneficial practices include multifunctional working, promoting effective team-working, developing in-house research capability, having a leadership team committed to innovation and having strong external relationships. Firms with owners from outside the focal services sector, in the present case legal services, prove more effective at both ideation and knowledge codification. We find little evidence that competition affects innovation, suggesting that de-regulation initiatives in the legal services sector have to improve if market forces are to operate effectively.

Keywords: Service innovation; legal services; professional services; innovation practices; ideation; codification

Innovation in legal services: the practices that influence ideation and codification activities

1. Introduction

Across all sectors, firms need to innovate in the delivery of goods and services to meet the needs of their customers (Pekovic and Galia 2009; Turner et al. 2013). However, 'technological innovation is by no means the only field in which service firms innovate … over time there has been a shift from the focus on binary frameworks towards frameworks that recognise a wider range of different types of innovation' (Vergori 2014, p. 147). Service innovation may involve new service development alongside new or improved delivery processes (Martin, Gustafsson and Choi 2016), meaning that definitions of service innovation tend to be general, reflecting novelty and commercialisation rather than new technology. For example, in their recent review of the service innovation literature, Carlborg et al. (2014) refer to the definition suggested by Barcet (2010, p. 51) that service innovation introduces 'something new into the way of life, organisation timing and placement of what can generally be described as the individual and collective processes that relate to consumers'. This comment emphasises the potential diversity of service innovation activity that may, for example, focus on how different elements of organisations' operations and/or marketed services contribute to value creation (Högström et al. 2016; Högström et al. 2010). In addition, Martin et al. (2016) state that 'value creation rather than technological innovation offers a more compelling view of service innovation'. Drawing on recent work by Snyder et al. (2016) and Witell et al. (2016), we adopt Patrício, Gustafsson and Fisk's (2018, p. 3) definition of service innovation as being 'a new process or service offering that is put into practice by an organization, and is adopted by, and creates value for one or more actors in a service network'.

Innovation, by its nature, is a collective process of idea generation and implementation that builds upon resources, skills, and personnel within firms (Gibson and Gibbs 2006). While many categorisations of service innovation activities exist (Love, Roper and Bryson 2011; Hidalgo and D'Alvano 2014), ideation and codification activities are ubiquitous in the innovation process. Ideation involves identifying market opportunities and potential solutions, while subsequent codification activity is the process by which information is codified into marketable service innovations. McDermott and Prajogo (2012) find that ambidextrous service firms that maintain both activities achieve better performance than organisations that focus solely on one activity. However, it is not easy to excel at both ideation and codification activities

simultaneously, with some authors arguing that ideation and codification activities tend to drive out the other, making it difficult for firms to achieve both, and perhaps encouraging specialisation in specific elements of the innovation process (Benner and Tushman 2003). Different innovation activities require different resources and capabilities, which may imply varying patterns of investment. Patterns of engagement with external partners such as customers may also differ between activities. The extent and value of partnering in the innovation process, and differences in the type of partners with which services firms engage, will also depend on firms' boundary spanning capabilities and the attitudes of the decision makers leading or shaping the innovation process (Jespersen 2010; Agrawal et al. 2010). Different organisational and leadership approaches may also be necessary for the ideation and codification activities in any innovation process (Rosing et al. 2011). Thus, firms must consider the practices they employ to acquire knowledge and transform it into a marketable innovation (He and Wong 2004).

The primary objective of this paper is to identify the firm-level activity-spanning practices which benefit service innovation generally, and the task-specific 'practices', from here on referred to as activity-specific practices, which benefit either ideation or codification. Our paper makes two contributions to service innovation research. First, we develop an integrative framework that builds on the 'activities' and 'practices' identified in previous studies of successful service innovation (Spithoven, Vanhaverbeke and Roijakkers 2013). For example, it is generally recognised that professional service firms (PSFs) gain competitive advantage by exploiting their intangible knowledge assets: this in turn often involves teamwork and the sharing and combining of knowledge within the firm (Fu 2015). We therefore place particular emphasis on practices related to team-working and multi-functional working, as well as emphasising activity-spanning practices (e.g. leadership, culture) which shape the environment for innovation within a firm. Our second contribution is to identify and calibrate the effect of these individual practices on successful service innovation. Our bespoke survey data, unlike the Community Innovation Survey data, distinguishes between practices for ideation and practices for codification; and so we are uniquely placed to identify the individual (activity-specific) practices that lead to successful ideation or codification activities, as well as the activity-spanning practices that benefit both ideation and codification. We also include two measures of codification activity, namely diversity of service innovations and service innovation sales. This approach allows is to address a gap in the service innovation literature

on how firm-level practices influence ideation and/or codification activities. Prior studies tend to disproportionately focus on exploration (Levinthal and March, 1993).

Our empirical analysis focuses on the providers of legal services in the UK. The legal services sector includes the activities of solicitors, barristers and other legal professionals such as patent attorneys, conveyancers and will writers. This sector has important economic and social functions, such as ensuring fair competition and enforcing property rights and contractual compliance, as well as addressing criminality, and ensuring the maintenance of domestic and human rights (Legal Services Board 2011; Rickman and Anderson 2011). Notwithstanding these unique features, legal service provision shares many of the standard attributes of other professional services - i.e. their intangible nature, inseparability, and extensive inter-activity between client and provider. In terms of the typology of service sectors developed by Miozzo and Soete (2001), legal services is characterised by the same type of buyer-supplier relationships as other 'specialised suppliers' of services (e.g. information technology) but differs from many similar sectors by being subject to more extensive regulation.

The remainder of the paper is organised as follows. Section 2 outlines our conceptual approach, and proposes an integrative framework comprising firms' innovation 'activities' and related 'practices'. Section 3 describes data collection and our empirical approach. Section 4 reports our econometric results, establishing the importance of the different practices identified in influencing innovation outputs. Section 5 concludes by discussing the main findings and implications.

2. Service Innovation

Professional services are a subgroup of the wider services sector; mainly advisory in nature, focusing on problem solving, where skilled professionals provide the services (Marr, Sherrard and Prendergast 1996). In professional service firms (PSFs), the fundamental resource is knowledge and information as both an input and an output in the production process (Nachum 1996). Similar to all firms, PSF's ability to maximise their innovative potential is fundamental to the long-term survival and growth of the firm (Baumol 2002; Schumpeter 1939), and the ability of their services to significantly contribute to the value creation and competitiveness of their clients (OECD 2006).

The service innovation landscape has undergone radical shifts, due in part to accelerating technological advances (Helkkula et al. 2018). Consequently, the body of scholarly research in this area, while relatively modest, is growing considerably (Patrício et al. 2017). Some reviews, such as that of Cusumano, Kahl and Suarez (2015), emphasise categories of product-related services from a product firm—smoothing and adapting services, which complement products, and substitution services, which enable customers to pay for the use of a product without buying the product itself. Recent work by Norman and Verganti (2014) emphasises the importance of design, i.e. the process of "making sense of things" for successful innovation. Bi-directional knowledge exchange characterises service activity with suppliers and customers acting as co-producers and co-creators of value (Grönroos and Ravald, 2011). Through this dynamic disposition of resources (people, technology, organisations and shared information) service providers and customers collaborate in various ways to create value (Hidalgo and D'Alvano 2014). Thus, the networked, iterative and open nature of service innovation emphasises the potential for customers to play a lead role in identifying market needs with positive implications for innovation quality (Jespersen 2010). Definitions of service innovation therefore tend to be quite general, reflecting novelty and commercialisation rather than new technology (Carlborg, Kindstrom and Kowalkowski 2014; Barcet 2010). This notion of the nature of service innovation emphasises the potential diversity of innovation activity that may, for example, focus on different elements of organisations' operations and/or marketed services, as well as explicitly acknowledging the requirement of a value component in service innovation.

2.1 Innovation activities

Innovation activities are often categorised reflecting a sequential process (Carlborg, Kindstrom, and Kowalkowski 2014; Hansen and Birkinshaw 2007; Roper, Du and Love 2008; Love, Roper and Bryson 2011). Terms like ideation, initiation or exploration are used to define early innovation activities, while later activities are often referred to as implementation, codification, commercialistaion or exploitation. Early, exploration activities may involve 'the pursuit of knowledge, of things that might come to be known', while subsequent exploitation activities may require more market focussed knowledge as part of 'the use and development of things already known' (Levinthal and March 1993). Zaltman, Duncan and Holbek (1973) differentiate between initiation and implementation activities; highlighting that initiation activities necessitate an openness to innovation, in other words, members of an organisation

must be open rather than resistant to new ideas and new actions within the organisation (Zaltman, Duncan and Holbek 1973). Similarly, Hurley and Hult (1998) distinguished between different types of innovation activities. They label firms' openness to new ideas 'innovativeness' which they regard as a reflection of organisations' cultural orientation to innovation (Hurley and Hult 1998). In line with Burns and Stalker (1961), Hurley and Hult (1998) then label the ability of the organisation to adopt new ideas, processes or products successfully as the 'capacity to innovate'. Some approaches include more categories of innovation activity, such as Hidalgo and D'Alvano's (2014) distinction of scan, focus, resource, implement and learn activities and Love et al.'s (2011) ideation, codification and commercialisation categories. Common to all categorisations, however, is an element of early, ideation activity and later, codification activity.

Given the complex nature of the process of innovating, previous studies highlight the need for firms to balance the requirements of different innovation activities (March 1991; Turner, Swart and Maylor 2013). The strategic and managerial challenge for innovating organisations is then to balance the short-term benefits of exploitation with the longer-term gains from exploration (Levinthal and March 1993). Exploration activities are captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation; whereas exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution (March 1991). Many studies have examined the 'ambidextrous hypothesis' and the 'ambidextrous organisation' (O'Reilly and Tushman 2011; He and Wong 2004), focusing on the 'optimal' balance between exploration and exploitation activities as '…maintaining an appropriate balance between [them] is a primary factor in system survival and prosperity' (March 1991, p. 71). Alternatively, one can view these stages as separate activities that occur simultaneously within an organisation: firms search for new knowledge while commercialising output resulting from the refinement or transformation of already existing knowledge (March 1991).

2.2 Innovation practices

Within practice theory, practices have been defined as "routinized ways in which bodies are moved, objects are handled, subjects are treated, things are described, and the world is understood" (Reckwitz, 2002, p. 250). Kjellberg and Helgesson (2007) explain that these practices in turn affect the way an individual behaves.

Another strand of research on innovation emphasises the importance of innovative practices (He and Wong 2004), that is, the individual practical steps required to acquire knowledge and transform it into a marketable innovation. We define an innovative practice as a strategic, managerial or organisational action undertaken to stimulate, initiate or implement changes in services or processes (Spithoven, Vanhaverbeke and Roijakkers 2013). For example, the introduction of cross-functional development teams might be an important part of the development of both process and service innovations (Song, Montoya-Weiss and Schmidt 1997). There is also evidence that senior management team composition influences innovation outcomes (Talke, Salomo and Rost 2010). In addition, external collaboration is important in services businesses (Love, Roper and Bryson 2011). Bundles of innovation practices then define a firms' innovation regime and may enable a firm to create synergies or complementarities between individual innovation practices (Love, Roper and Vahter 2014; Love and Roper 2009; Cassiman and Veugelers 2006). Furthermore, innovation practices may include both in-house and boundary spanning practices.

Innovation practices can be thought of as firm level inputs to the innovation process. Outcomes may include early activities, such as ideation, as well as later, more commercial, activities. The next section outlines the innovation practices that are likely to support different innovation activities.

2.3 Linking innovation practices and innovation activities

Innovation practices may be activity-specific, i.e. focussed on achieving some specific task, or be activity-spanning and have a more general enabling intent. Here, we focus on two 'activities' and define ideation as an activity for identifying market opportunities and potential solutions, and a codification as an activity in which information is codified into marketable service innovations (Figure 1). While ideation activities will naturally occur prior to codification activities in any given innovation process, it is important to consider both as a distinct activities, particularly given the networked, iterative and open nature of services innovation (Jespersen 2010). McDermott and Prajogo (2012) find that ambidextrous service firms outperform organisations that focus solely on either exploitation or exploration. Firms that successfully balance exploration and exploitation activities tend to be in a better position to consistently search and absorb novel information as well as integrate new knowledge associated with exploratory learning (Kollmann and Stoeckmann 2010; Chang and Hughes 2012; Kang et al. 2007; Kang and Snell 2009). Any attempt to successfully balance the requirements of different

innovation activities as highlighted by March and others (March 1991; O'Reilly and Tushman 2011), requires an understanding of which practices will be of benefit to ideation and, codification, individually and collectively.

2.3.1 Activity-spanning practices

Four overarching practices seem important in terms of the extent to which a firm's structures and culture are supportive of both ideation and codification (Figure 1). First, the importance of firms' innovation culture which guides it in adapting, integrating and reconfiguring technological capabilities, managerial capabilities and resources endowment as necessary in order to maintain and enhance continuous innovation. Second, successful innovation requires that firms and managers provide clear and consistent signals to employees about the goals and objectives of the firm (Guan 2009; O'Reilly and Tushman 2011), as it is important to achieve relational coordination between the involved actors (Gittell 2001). Senior management team attitudes and decisions which are a function of their education, functional background, experience, and values may also influence firms' innovation (Smith 1994). Therefore, senior management team composition may directly affect innovation strategy and resulting innovation outcomes (Talke, Salomo and Rost 2010). Third, clear signals and public recognition of employees' accomplishments serve to motivate other employees to greater effort in meeting the firm's objectives (Trice and Beyer 1984). Acknowledging and rewarding practices (such as, adoption of new practices and processes, implementation of new services, solving problems in a novel way and bringing new practices to the firm) has been shown to have a positive influence on innovative behaviour and firm performance in Australian law firms (Hogan and Coote 2013). Fourth, the importance of training employees to develop innovative products, services and processes has been widely appreciated by innovation scholars (Freel 2005). Skilled staff are often said to play a dual role in innovation – assisting firms with the development of new ideas inside the firm but also having greater absorptive capacity – i.e. the ability to identify, assess and appropriate knowledge from outside the firm. R&D and design staff are often said to play a similar role in their specific functions (Griffith, Redding and Van Reenan 2003).

These practices relating to culture, leadership, senior management, work organisation and ownership we define as 'activity-spanning practices'. Drawing on the discussion above, we expect activity-spanning practices to influence the ideation and codification activities of service innovations as follows. This leads us to our first hypothesis:

H1a: Activity-spanning practices are positively related to ideation outcomes (the identification of external ideas in terms of market opportunities and solutions) in service innovation.

H1b: Activity-spanning practices are positively related to codification outcomes, i.e. (i) service innovations and (ii) service innovation sales.

2.3.2 Activity-specific practices

Achieving success in ideation and codification activities may also require very different combinations of innovation practices involving, for example, different partners and varied leadership styles (Kang, Morris and Snell 2007; O'Reilly and Tushman 2011; Love, Roper and Bryson 2011).

Ideation activities may be characterised by collaborative innovation practices emphasising links to customers, competitors and the professional associations which are common across a range of service sectors (Love, Roper and Bryson 2011). Indeed, within the 'design-research' literature, user-led innovation can serve as an insightful research tool to lead designers to more radical innovations (Norman and Verganti 2014; Thomke and Von Hippel 2002). There is also strong evidence that multifunctional teams can contribute positively to service firms' ideation activity (Love, Roper and Bryson 2011). This effect may be weaker, however, in legal services where firms have tended to foster a culture of individual practice (Kabene, King and Skaini 2006), and may discourage non-fee earning activities such as knowledge sharing (Terrett 1998).

As discussed previously, while activity-spanning practices are likely to be important for both ideation and codification activities; firms' ideation activity will also be associated with a bundle of innovation practices specific to ideation. Ideation-specific practices will include idea generation and sourcing through ideation oriented multi-functional teams and collaboration with customers (Witell et al. 2011). We anticipate that these ideation-specific practices will be positively relate to ideation success indicators such as firms' ability to source new ideas from outside the firm. This leads us to our second and third hypotheses:

H2: Externally directed ideation-specific practices are positively related to the success of firms' ideation activities (the identification of external ideas in terms of market opportunities and solutions)

H3: The multifunctionality of ideation-specific practices is positively related to the success of firms' ideation activities (the identification of external ideas in terms of market opportunities and solutions)

For codification activities, innovation practices related to multifunctional working and team-working as well as external collaboration have all been shown to be important in services businesses (Love, Roper and Bryson 2011). This is in line with organisational behaviour research which reports that groups use fewer trials in finding a solution than the best of an equivalent number of individuals do, and groups generally perform better than the best individuals on highly demanding and complex problems (Laughlin, Bonner and Miner, 2002; Laughlin et al. 2006).

Therefore, practices specific to codification may include organisational practices within the firm such as multifunctional-working and team-working, as well as boundary-spanning practices involving external collaboration (Sanders and Stappers, 2008). The success of both will be reflected in measures of codification outcomes such as new service innovations and sales from new service innovations. This leads us to H4-H7:

H4: In-house codification-specific practices are positively related to (i) service innovations and (ii) service innovation sales

H5: Externally directed codification-specific practices are positively related to (i) service innovations and (ii) service innovation sales

H6: The multifunctionality of codification-specific practices is positively related to (i) service innovations and (ii) service innovation sales

H7: Team work in codification-specific practices is positively related to (i) service innovations and (ii) service innovation sales

Our final hypothesis pertains to the relationship between ideation and codification. Previously, Love, Roper and Bryson (2011) reported a positive relationship between ideation activities and innovation outputs. Therfore, we expect ideation activties, as measured by the prorpotion of external ideas sourced by firms, to positively influence codication activties, as measured by service innovations and sales.

H8: Ideation activities are positively related to (i) service innovations and (ii) service innovation sales

3. Data and Methodology

3.1 Survey Design

Prior to designing the survey questionnaire, a series of twenty exploratory case studies with legal service providers were undertaken. The case studies revealed both ideation and codification activities among legal services firms, as well as considerable diversity of innovation, for example, service, delivery, organisational and marketing innovation. It was clear that some firms have explicit innovation strategies and translate this into organisational practices; other legal services firms adopt a more ad-hoc approach to innovation. While law organisations tend to foster a culture of individual practice, and lawyers are not generally recognised as adopting a team-based working approach (Kabene, King, and Skaini 2006), both firm-level and more targeted innovation practices are clearly implemented by some legal services firms. Specific innovation practices identified included multi-functional working, team leadership, and external collaboration.[1]

Reflecting our initial conceptualisation, i.e. the activities-practices framework, and the outcomes of the qualitative case studies, the survey questionnaire was structured to obtain information on ideation and codification activities, as well as firms' activity-specific and activity-spanning practices. Initial sections of the questionnaire collected data on the nature and activities of the business. A subsequent section focussed on activity-spanning practices related to leadership, policies and routines related to innovation and work organisation. Two further sections of the questionnaire then asked separately about activity-specific practices related to ideation and knowledge codification.

[1] See Roper (2015, 2016) for further detail of the twenty exploratory case studies.

Our analysis is based on information provided by a single rater in each organisation with the dependent and explanatory variables derived from the same survey. Common methods variance is therefore a concern (Podsakoff et al. 2003). In the questionnaire design we use different scale types to reduce potential concerns and, wherever possible, randomise item lists to offset any cognitive biases. We also use multivariate statistical analysis and alternative dependent variables which use different scale types to reduce any related biases (Chang, van Witteloostuijn and Eden 2010).[2]

3.2 Survey Data Collection and Sample

Our analysis is based on a structured telephone survey of legal service providers in Standard Industrial Classification (2007) 69.1 in England and Wales conducted during March and April 2015[3]. The focus was on businesses for which the provision of legal services was their main activity, e.g. barristers' chambers, solicitors, patent and copyright agents, notaries, bailiffs, and arbitrators (see Annex 1). Sampling frames were provided by the Legal Services Board for barristers' chambers, for solicitors by the Solicitors Regulation Authority and other legal service providers by Experian. The questionnaire was piloted using 'live' CATI interviewing over a 2-day period from 23rd to 24th February 2015 and involved 11 solicitors and 5 barristers' chambers. The aim was to make improvements to the script to ensure common understanding and/or help to ensure that as many of the individual circumstances of survey respondents were reflected and catered for within the questionnaire. Some wording changes were made to the questionnaire as a result of the pilot. The main issue highlighted, however, was one of questionnaire length. As a result some questions were dropped, options amalgamated and open ended questions were included for only a proportion of respondents. Fieldwork was completed on the 16th April 2015. The survey was structured by employee sizeband and responses are weighted to provide representative results. Approximately, 1,500 legal services firms completed the survey, around 10 per cent of all legal service providers.[4]

[2] Among those variables used in our final analysis principal components factor analysis identified 12 factors with eigenvalues greater than one which, in combination, accounted for 63 per cent of the sample variance. The single most powerful factor accounted for 21 per cent of the sample variance. A single factor model also fits the data poorly with RMSE of 0.125-0.135 and SRMR of 0.135-0.161. Both tests suggest that common method variance is unlikely to compromise our analysis.

[3] Legal regulation in England and Wales derives from the Legal Services Act 2007. Regulated activities include: patent and trade mark attorneys, notaries, legal executives, licensed conveyancers and cost lawyers. Un-regulated activities include: will writers, bailiffs, arbitrators, examiners and referees etc. Legal services in Scotland and Northern Ireland have separate regulatory frameworks.

[4] See Roper et al. (2015; 2016) for a more detailed description of survey design, administration and data collection.

3.3 Operationalisation and Measurement of Variables

In the ideation stage, the dependent variable is the proportion of ideas sourced externally – which in other studies of professional services has been positively linked to innovation success (Love et al. 2011). This variable captures the degree of openness of each firm to including external knowledge within its innovation, a variable we would expect to be strongly related to external collaboration. Within our sample, respondents report that 6.2% of ideas are externally generated (see Table 1 for descriptive statistics for dependent and independent variables and Annex 2 for variable descriptions). The codification stage relates to the development of marketable innovations. Here, in line with previous studies, we consider two alternative dependent variables: the percentage of firms' sales derived from innovative services; and, a percentage measure of the diversity of firms' innovation outputs[5] (Love et al. 2011). On average, innovation sales as a percentage of turnover are 6.4 per cent, while firms typically report almost two types of innovation activities (29.4 per cent). The percentage of sales derived from innovative services is a standard indication of innovation success and provides an early indicator of the market returns from firms' innovation. The diversity of innovation measure is an indicator of the breadth and extent of firms' innovation over and above the introduction of new or improved services.

We include a number of variables that capture activity-spanning practices, essentially practices employed by firms to benefit innovation activities, whether that be ideation and/or codification practices (Figure 1). Independent variables which measure research conducted in-house (36 per cent) and externally (11 per cent) are included, as well as investments in Information Technology (64 per cent). Both practices have been linked to innovation outcomes in previous studies. We also include whether the firm has leadership (7 per cent), processes (47 per cent) and rewards (25 per cent) in place for developing new ideas (Table 1). We anticipate positive innovation outcomes from these organisational practices. Finally, 23 per cent of firms in our sample are wholly or partially non-lawyer owned. This ownership variable reflects the diversity of background and experience in the firm's management team, and our expectation is that it

[5] We measure the diversity of innovation with a scale variable reflecting the percentage of six different types of innovation activity undertaken by the firm (service, processes, strategy, management systems, organisational change, marketing innovation). For instance if a firm engaged in three of the six, their score on this diversity scale would be 50% (see Annex 1).

will positively impact innovation activities (Talke et al. 2010). Offsetting these positive effects are the potential negative effects of regulation, legislation and resource constraints linked to finance, market opportunities or a lack of perceived collaboration opportunities (Hewitt-Dundas 2006). These constraints may restrict firms' ability to adopt activity-spanning practices with negative implications for innovation. In our data these constraints are represented by a series of barriers to innovation including, among others, financial barriers (19 per cent), information demands from regulators (16 per cent) and limited market opportunities (14 per cent).

Survey respondents were also asked to identify whether they engaged in activity-specific practices related to external collaboration, multifunctional working and team-working (Figure 1). Notably the profile of activity-specific practices differed markedly between ideation and codification. Activity-specific practices for ideation include, among others, collaboration with clients (21 per cent), competitors (17 per cent) and professional associations (14 per cent). For codification, collaborative practices with technology suppliers (11 per cent) and regulators (5 per cent) were observed (Table 1). We also include multifunctional working for ideation (16.4 per cent) and codification (15.7 per cent) activities, as well as team-working for codification activities (14.2 per cent). Prior research has identified how activity-specific practices such as knowledge acquisition and knowledge transformation in professional service firms can positively influence innovation activities (e.g. Love et al. 2011). We therefore anticipate positive innovation effects from these activity-specific practices. We also include a number of control variables, such as firm size (number of employees), vintage (age of firm), and practice type (solicitors, barristers, other legal service providers (OLSP) – regulated and unregulated). In addition, we take account of firms' main competitors, with over 60 per cent of firms reporting that their main competitors are based in the same region (Table 1).

3.4 Empirical Analysis

Each of our dependent variables are percentages and tobit estimation is therefore appropriate. We first estimate single equation models for ideation and codification activities. Both models include variables capturing activity-spanning practices. Support for H1 requires positive and significant coefficients for these variables. In addition to activity-spanning practices, the ideation model includes variables measuring ideation-specific practices and allows us to test

hypotheses 2 and 3. The codification model includes variables measuring codification-specific practices and also ideation activities, providing tests for H4-7 and H8 respectively.

This implicitly assumes that there is no simultaneity between these two stages in the innovation process. In a robustness test, we consider the possibility that decisions made relating to codification activities are conditional on the outcomes of the ideation stage. To model this sequential decision process we use the CMP module within Stata 14 (Roodman, 2011). This allows us to embed the tobit model for the percentage of external ideas within the models for innovation sales and diversity.

4. Econometric Results

4.1 Activity-Spanning Practices: Ideation and Codification

Our analysis of ideation activities, as measured by the proportion of ideas sourced externally, is presented in Table 2. Our analysis of codification activities, as measured by service innovation and service innovation sales, is reported in Table 3. Our first hypothesis states that activity-spanning practices are positively related to (a) ideation and (b) codification.

In terms of activity-spanning practices, ideation is strongly influenced by whether the firm is lawyer or non-lawyer owned: firms which are fully or partially non-lawyer owned utilise a larger proportion of externally sourced ideas (Table 2). This is consistent with the results of Talke et al. (2010) who, for a sample of US and European listed firms, find that diversity in firms' top management team both shapes the orientation of firms towards specific types of innovation but also their subsequent success. Particularly interesting is the presence of this practice along with that of multi-functionality in firms' innovation activity, two effects which have previously been shown to have positive complementarities (Auh and Menguc 2005).

Environmental factors also prove important in ideation. Legislation and regulation have significant but contrasting positive and negative effects. More general elements of the business environment such as a shortage of finance for innovation, market opportunities, and a lack of collaborators also prove important (Hewitt-Dundas 2006), although the (positive) effects are the opposite of what might have been anticipated if these effects operate as resource constraints. This type of positive effect is, however, a general finding in the innovation literature, reflecting

the endogeneity of these constraints where firms are more strongly engaged in innovation rather than applying generally (Efthyvoulou and Vahter 2012). It is therefore difficult to directly interpret these environmental effects as either enablers or barriers to innovative activity.

Activity-spanning practices also prove important for codification. Non-lawyer ownership again has a positive and significant impact on firms' codification activity. More diverse ownership structures therefore appear to contribute to legal services firms' innovative outcomes through two mechanisms, increasing both ideation (Table 2) and codification (Table 3). The significance of both mechanisms reinforces the value of more flexible ownership regulation in the sector (Parker, Gordon and Mark 2010). It also reinforces earlier evidence of the significance of firms' strategic and organisational choices in terms of innovation and the value of structured rather than ad hoc innovation processes (Sundbo 1997; Miles 2007; Leiponen 2001; Leiponen 2005).

Therefore, we find strong support for H1 that activity-spanning practices are positively related to (a) ideation and (b) codification. Next, we consider activity-specific practices and their influence on ideation (4.2) and codification (4.3)

4.2 Activity-Specific Practices: Ideation

Our results emphasise the importance of two ideation-specific practices - multifunctional working and external collaboration – for the proportion of ideas sourced externally. Both practices are positively related to ideation outcomes (Table 2). The positive and statistically significant coefficient for multifunctionality may relate to internal knowledge sharing and diffusion within each firm, which has been emphasised in the past as one of the key elements of implementing open innovation (Chesbrough 2003).

Perhaps unsurprisingly, collaboration with suppliers, customers, clients, professional associations and technology suppliers also increases the proportion of ideas sourced externally (Table 2). Previous studies have highlighted the importance of a culture of openness for service innovation (Chen et al. 2009). Notably the strongest effects arise from collaboration with customers and technology suppliers reflecting previous studies which have noted the

importance of customer input at the early stages of any service innovation process (Jesperson 2010; Magnusson et al. 2003). More unexpected perhaps is the significant and positive role played in ideation by collaboration with professional associations in helping legal service providers to access external ideas (Newell and Swan 1995; Swan and Newell 1995).[6]

Therefore, we find strong support for our second and third hypotheses that externally directed and multifunctionality ideation-specific practices are positively related to ideation activities.

4.3 Activity-Specific Practices: Codification

Our analysis of codification practices takes into account the proportion of externally generated ideas and focuses on two alternative dependent variables: the percentage of sales derived from innovative services and the diversity of firms' innovation outputs (Table 3).

In-house research activity is positive and significant in both models (Pires, Sarkar and Carvalho 2008), providing support for H4 that in-house codification-specific practices are positively related to (i) service innovations and (ii) service innovation sales. This may reflect both the value of research activity in generating new ideas to drive service innovation but also the absorption of external knowledge (Griffith, Redding and Van Reenan 2003)[7].

Our results also emphasise the value of boundary spanning practices specific to codification (Table 3). Interestingly, here rather different external connections prove important for innovation sales (Table 3, Model 1) and the diversity of firms' innovation outputs (Table 3, Model 2). Collaboration with professional associations contributes most positively to innovation sales offset by a rather more surprising negative effect of collaboration with customers[8]. For innovation diversity, collaboration with regulators and technology suppliers prove most positive, again offset by a negative effect from collaboration with customers.

[6] Note however that organisations such as the Law Society have sponsored awards for Business Development and Innovation as part of their Excellence Awards initiative and supports a range of 'communities' for solicitors with particular demographic or practice characteristics. See for example: http://www.lawsociety.org.uk/support-services/events-training/excellence-awards/2014-winners/excellence-in-business-development-and-innovation.

[7] However, while Pires et al. (2008), find a positive innovation effect from extra-mural research in Portuguese services, we find a weak positive effect in terms of innovation diversity but a strong *negative* effect on innovation sales (Table 3). Some care is necessary in the interpretation of this effect, however, as this may reflect the endogeneity of this variable as well as potentially substantive effects such as competition from previous research partners.

[8] In their analysis of innovation in UK professional services, Love et al. (2011) find a not dissimilar pattern: linkages with customers have a markedly positive effect on sourcing external ideas, but a marginally negative effect on innovation outputs.

Therefore, while we find support for H5 that boundary spanning codification-specific practices are positively related to (a) service innovations and (b) service innovation sales, it is important to note that this relationship is not necessarily consistent for different practices and different outcome indicators of codification.

In addition, codification practices related to multifunctional working and team-working contribute positively to both innovation sales and the diversity of firms' innovative output (Table 3). The significance of both variables suggest the value of structured processes for innovation, even in the context of a professional services sector. Our analysis, therefore, supports Hypotheses 6 and 7 that multifunctionality and teamworking in codification practices is positively related to codification activities, as measured by service innovations and service innovation sales.

Finally, the proportion of external ideas used by the firm is positively and significantly linked to codification activities, both service innovation and service innovation sales (Table 3), suggesting the importance of openness in firms' innovation activities (Love, Roper and Bryson 2011), and providing strong support for H8 that ideation activities are positively related to codification activities.

4.4 Robustness test

The potential endogeneity of the proportion of externally sourced ideas in the codification stage of the innovation process suggests the value of alternative estimation approaches which allow for this possibility. In Table 4 we therefore report conditional recursive mixed process (CMP) estimators following Roodman (2009, 2011). This flexible estimator allows us to embed a model for the proportion of externally sourced ideas directly within the models for innovation sales and the diversity of innovation producing consistent estimators and efficient estimates which take into account both the bounded nature of the dependent variable and error co-variances. This approach essentially amounts to instrumenting the proportion of externally sourced ideas within the two codification models, with the validity of the instruments (i.e. the determinants of the proportion of externally sourced ideas) depending on two conditions – their fit and a lack of correlation with any unobserved factors which may explain the innovation output indicators. We use the variable set from Table 2 to ensure consistency with the first condition. Here, $F(18,1348)=18.98$, well above the usual benchmark for weak instruments

(F>10). No formal test is available to assess the validity of the second condition but a test of the joint significance of the set of variables from the ideation model in the codification model suggests their weak direct influence (F(13, 1260)=2.54, rho=0.0019).

Table 4 reports the CMP estimates in detail and Tables 5 and 6 provide a symbolic summary of the single equation and CMP estimation results. The results prove strongly consistent in terms of both sign and significance with some minor variations. In particular, we continue to see strong positive links between the proportion of externally sourced ideas and firms' innovative output; research and external collaboration remain important in both ideation and codification estimations; as does firm ownership (Tables 5 and 6).

5. Discussion and conclusion

The aim of this paper is to better understand how individual innovation practices benefit ideation and codification innovation in the professional services sector. We calibrate the impact of individual innovation practices on firms' ideation activities, and on subsequent codification activities. Our conceptual framework differentiates between 'activity-spanning' practices which set the context for innovation in the firm, and contribute to the success of both ideation and codification activities, and 'activity-specific' practices which impact only the success of either ideation or codification. Using new survey data, we evaluate the impact of activity-spanning and activity-specific practices. Our analysis suggests a number of conclusions, relating to activity-spanning practices and activity-specific practices and their influence on service innovation outcomes.

Activity-spanning practices relate to culture, leadership and work organisation and create an enabling environment within which the more task-focussed activity-specific practices can flourish. Effective IT systems, for example, and management processes which reward and encourage innovative thinking are conducive to both ideation and codification activities. Within such an enabling framework, task-focussed teams and/or external collaborations which have clear and unambiguous goals are most likely to be effective. Our empirical results provide strong support for the importance of activity-spanning practices which create an enabling environment for innovation.

We also find that our sample of legal services firms derive positive innovation benefits from non-lawyer ownership which, as an activity-spanning practice, has a dual benefit – improving both ideation and codification outcomes. Although there is little comparable evidence from outside legal services these results are consistent with the generally acknowledged contribution of diversity to ideation as different perspectives contribute to and create novel responses (Harvey 2013). The positive impact of non-lawyer ownership on the effectiveness of codification also reflects broader evidence related to the extent of innovation among firms with more diverse workforces and top management teams (Talke, Salomo, and Rost 2010).

In addition, we find strong evidence that firms implementing structured and organised processes – activity-specific practices – are more successful in their innovation activity. These can be related to the key aspects of relational routines and relational coordination outlined by Fu (2015). Task-focussed, multi-functional working contributes positively to both ideation and codification. Task-focussed external relationships also prove important in both ideation and codification. Our results point to the importance of a culture of openness for service innovation particularly in relation to the strong influence of collaboration on ideation activities. In terms of codification, the value of multifunctional working is reinforced where firms value and adopt positive steps to promote effective team-working. In addition, having a leadership team open to exploring the potential value of new ideas from outside the firm also proves important for codification.

Our analysis also reveals the role of research – codification-specific practices- in driving service innovation in relation to codification activities. This issue has been widely debated with some studies suggesting that it plays a less important role than in manufacturing and others, in the synthesis tradition, suggesting a more homogenous effect (Pires, Sarkar, and Carvalho 2008). Here, our evidence suggests a marked distinction between the positive contribution of in-house and negative effect of external research activity on codification (Table 6). The effect of task-focussed, activity-specific in-house research on codification is, as anticipated, positive reflecting both the contribution of research staff to innovation and external knowledge absorption (Roper and Love 2002). Where activity-specific research is conducted externally this has an unexpected negative impact on codification outcomes. This may reflect knowledge leakage in collaborative research projects with negative consequences for firms' ability to benefit from future innovations (Frishammar, Ericsson, and Patel 2015). An alternative – non-exclusive – explanation for the negative effect of external research activity

relates to the difficulty of managing external research projects which may distract managerial resources from other aspects of the innovation process (Laursen and Salter 2006).

It is also important to note our results in relation to one of our control variables, competition, of particular importance in terms of policy development. We find little evidence that competition at either regional, national or international level is playing any significant role in stimulating legal service innovation. This runs contrary to some prior evidence for legal services (Correa and Ornaghi 2014) but is consistent with recent evidence for European banking (Tabacco 2015).

5.1 Theoretical implications

Our analysis suggests the value of considering firms' innovation within a framework which identifies 'activities' and 'practices'. In our analysis both activities – ideation and codification – are associated with task-focussed, activity-specific practices which contribute to the success of each activity. In ideation, activity-specific practices include idea generating teams and collaboration with suppliers or customers focussed on new idea generation. In codification, activity-specific practices include in-house research and teams focussed on bringing new innovations to market. The success of both ideation and codification, however, also depends on activity-spanning practices which define the environment within which these activity-specific practices take place. These activity-spanning practices include both aspects of organisational leadership as well as management and operating practices and information technology. Either may either enable or constrain effective activity-specific practices.

Our empirical results suggest the limitations of processual perspectives on innovation which only consider activity-specific practices, and omit any consideration of firm-level, activity-spanning practices. In this sense the often-made distinction between exploration and exploitation may not fully capture practices which enable both activities. At the same time, analyses which treat innovation as a single undifferentiated activity may miss the contrasting profiles of activity specific practices which prove important in ideation and codification. Instead, our evidence points to the need for a more hierarchic conceptualisation including both firm-level, activity-spanning practices which enable innovation alongside activity-specific, task focussed practices.

5.2 Managerial Implications

Our results have direct implications for professional service businesses seeking to upgrade or develop their innovation activity. At the level of the firm a range of activity-spanning practices seem important to ensuring innovation success: broadening the ownership of the enterprise, ensuring that the business leadership adopt an 'open' attitude to new ideas, and putting in place structures to support team-working, collaboration and multifunctional working all prove important. Investments in internal research capacity also have potential benefits for innovation outcomes. More task-oriented practices – team-working, collaboration – can then be focussed on specific innovation goals or aspirations.

More generally our results confirm the value of a structured process for undertaking innovation in professional services, reflecting the emphasis on the importance of innovation and technology management in manufacturing firms. This raises questions about whether a wholly 'new' or specific conceptualisation of service innovation is actually needed. Rather, our results are consistent with much of what has been written about the implementation of, and capabilities necessary for, inward open innovation (Chesbrough 2003, 2006) and involve elements of the 'expertise-based' and 'turf-based' innovation pathways suggested by Anand et al. (2007)[9].

It is worth re-iterating our finding in relation to the negative relationship between external research activities and codification (specifically the diversity of firms' innovation). This finding is interesting in the context of Skaggs and Youndt (2004) work on the relationship between human capital and co-production in service firms. They find that co-production is not always an ideal solution for service providers. Future work should perhaps consider the quality of external research activities as this is likely to influence the impact of such activities on innovation outcomes, in the same way that expert versus novice clients may influence the effectiveness of co-production for service firms (Skaggs and Youndt, 2004).

5.3 Policy Implications

At a policy level the potential value of legislation in stimulating innovation – such as that relating to Alternative Business Structures (ABS) – is clear in facilitating more diverse ownership and financing structures. More significant perhaps is our evidence of the lack of any

[9] Anand et al. (2007) define three pathways for service innovation: expertise-based where emergent knowledge is developed by employees; turf-based, where new knowledge is developed in partnership with external agents; and support-based, where new knowledge is generated from firms' top-level goals and plans.

competition effect in driving innovation in legal services provision, and the lack of any significant difference in the level of innovative activity even in those sectors where legal service activities are 'unregulated'. This suggests the value of considering further legislative and regulatory changes which might encourage greater competition and potentially innovation.

5.4 Limitations of Study

Our study provides some new information on the drivers of innovation in professional services. It also suggests the potential value of a conceptual and measurement framework structured around 'activities' and 'practices' which could be applied in other contexts where innovation is poorly understood. A number of limitations apply to our analysis. First, it remains cross-sectional and our modelling therefore captures correlation rather than causality. Second, our data and analysis relates to legal services in England and Wales, and not the rather differently structured legal services sectors internationally and in other parts of the UK. Nonetheless, this is a 'first-look' examination of innovation in legal services, a section of professional services largely ignored in other studies of service innovation (Rickman and Anderson 2011; Tilly 2013). In addition, it is important to be cognisant that some findings may pertain specifically to legal services, such as the finding on non-lawyer ownership. Finally, we focus here only on firms' ideation and codification activities. Commercialisation, which may involve much longer time-lags, remains to be explored.

Figure 1: Service Innovation: Activities & Practices Framework

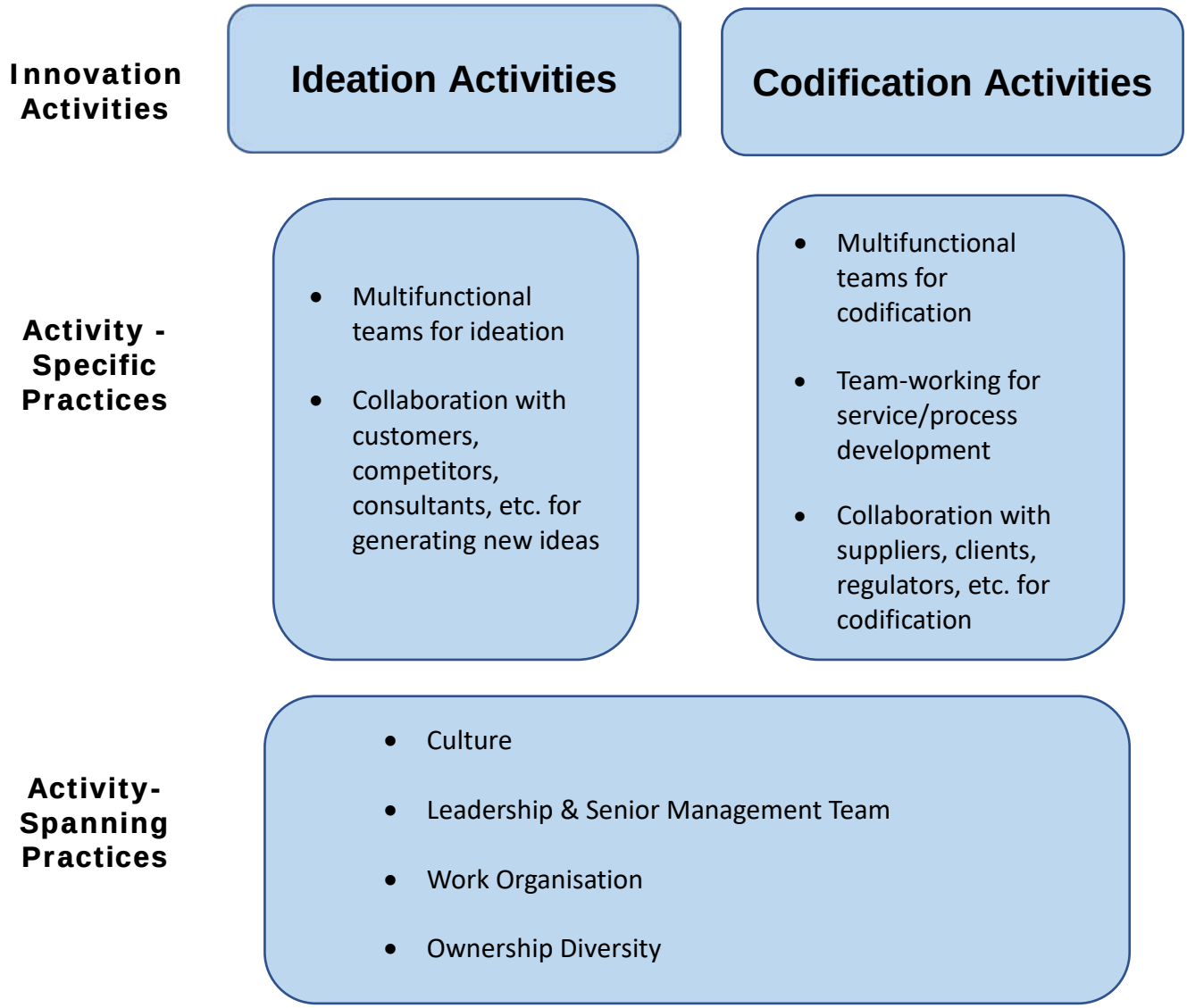


Table 1: Sample descriptives

	Obs.	Mean.	SD.
Dependent variables			
Proportion of ideas externally generated (%)	1426	6.185	15.361
Innovation sales (% of turnover)	1439	6.434	16.839
Diversity of innovation (%)	1429	29.379	28.153
Activity-spanning practices			
Research conducted in house (% firms)	1478	0.357	0.479
Research conducted externally (% firms)	1489	0.112	0.316
Invested in new IT (% firms)	1493	0.635	0.482
Non-lawyer owned (% firms)	1500	0.227	0.419
Leadership for new ideas in place (% firms)	1500	0.700	0.458
Processes for developing ideas in place (% firms)	1500	0.472	0.499
Rewards for developing new ideas in place (% firms)	1500	0.252	0.434
Lack of expertise – signif. barrier (% firms)	1500	0.125	0.331
Finance significant barrier (% firms)	1500	0.185	0.389
Market opportunities signif. barrier (% firms)	1500	0.143	0.351
Lack of collaborators signif barrier (% firms)	1500	0.072	0.259
Info. demands by regulators (negative effect, % firms)	1500	0.156	0.363
Legislation (negative effect, % firms)	1500	0.072	0.258
Ideation practices			
Collaboration – suppliers	1500	0.117	0.322
Collaboration – clients	1500	0.211	0.408
Collaboration – competitors	1500	0.173	0.378
Collaboration – consultants	1500	0.127	0.333
Collaboration – professional associations	1500	0.141	0.348
Collaboration – accountants	1500	0.135	0.342
Collaboration – technology suppliers	1500	0.166	0.372
Multifunctional working – ideation (%)	1442	16.356	27.072
Codification practices			
Multifunctional working – codification (%)	1442	15.702	25.587
Team-working – codification (% firms)	1410	14.241	29.805
Collaboration – suppliers	1500	0.074	0.262
Collaboration – clients	1500	0.078	0.268
Collaboration - professional associations	1500	0.055	0.229
Collaboration - technology suppliers	1500	0.115	0.320
Collaboration - regulators	1500	0.049	0.217
Controls			
Employment in 2012	1496	41.731	161.568
Age of the enterprise	1494	17.442	11.454
Facing regional competition (% firms)	1500	0.607	0.488
Facing national competition (% firms)	1500	0.302	0.459
Facing international competition (% firms)	1500	0.053	0.225
Solicitors' firm	1500	0.629	0.483
Barristers' chambers	1500	0.104	0.305
OLSPs – (regulated)	1500	0.048	0.213
OLSPs (unregulated)	1500	0.219	0.414

Notes and sources: Variable definitions in Annex 1. Observations are weighted. Source: Survey of Legal Service Providers

Table 2: Modelling ideation: Tobit

Dependent variable	% of ideas sourced externally
Ideation practices	
Multifunctional working	0.167**
	(0.070)
Collaboration – suppliers	10.040**
	(4.737)
Collaboration – clients	32.309***
	(5.282)
Collaboration – competitors	10.975***
	(3.971)
Collaboration – consultants	5.98
	(4.331)
Collaboration – professional associations	10.928***
	(3.938)
Collaboration – accountants	4.451
	(4.331)
Collaboration – technology suppliers	22.460***
	(4.449)
Activity-spanning practices	
Non-lawyer owned	9.453**
	(3.827)
Info demands by regulators (negative effect)	-6.128*
	(3.607)
Legislation (negative effect)	5.128*
	(3.004)
Finance significant barrier	5.914*
	(3.407)
Market opportunities signif. barrier	-4.949
	(3.735)
Lack of collaborators signif barrier	10.844**
	(5.461)
Controls	
Employment in 2012	0.016**
	(0.008)
Barristers' chambers	-4.208
	(5.560)
OLSPs (regulated)	-4.874
	(5.944)
OLSPs (un-regulated)	2.151
	(3.803)
Number of observations	1366
Pseudo R^2	0.234
Bic	1634.952

Notes and sources: Observations are weighted. Marginal values are reported. * denotes significant at 10 per cent, ** at 5 per cent and *** at 1 per cent. Source: Survey of Legal Service Providers.

Table 3: Modelling innovation sales and diversity: Tobit

	(1)	(2)
Dependent variable	Innovation sales	Diversity of innovation
Proportion of ideas externally generated	0.570***	0.372***
	(0.110)	(0.065)
Codification practices		
Research conducted in house	8.759**	12.125***
	(4.313)	(2.156)
Research conducted externally	-17.990***	1.623
	(6.131)	(3.066)
Multifunctional working – Codification	0.587***	0.500***
	(0.079)	(0.047)
Team-working – Codification	0.262***	0.119***
	(0.064)	(0.040)
Collaboration – suppliers	13.547*	4.128
	(7.578)	(4.169)
Collaboration – clients	-15.708**	-8.270**
	(7.463)	(4.003)
Collaboration – Prof. Assoc.	25.785***	-1.757
	(8.638)	(5.446)
Collaboration – Tech. Suppliers.	10.534	7.516**
	(8.033)	(3.647)
Collaboration – Regulators	-8.657	12.750**
	(9.612)	(5.860)
Activity-spanning practices		
Invested in new IT	6.390*	7.932***
	(3.874)	(2.076)
Non-lawyer owned	8.340*	6.442**
	(4.488)	(2.608)
Leadership for new ideas in place	11.130**	12.013***
	(4.683)	(2.346)
Processes in place	1.497	4.236*
	(4.251)	(2.300)
Rewards In place	-1.527	3.847
	(4.452)	(2.548)
Lack of expertise – signif. barrier	-4.407	3.207
	(4.858)	(2.967)
Controls		
Employment in 2012	-0.045**	0.047***
	(0.022)	(0.014)
Employment in 2012 squared	0	-0.000***
	(0.000)	(0.000)
Age of the enterprise	-0.303*	-0.165**
	(0.159)	(0.083)
Facing regional competition	-2.825	6.678
	(13.070)	(5.470)
Facing national competition	11.349	5.117
	(12.916)	(5.518)
Facing international competition	7.691	-1.809
	(13.768)	(7.421)
Barristers' chambers	3.589	-9.768**
	(6.949)	(3.898)
OLSPs (regulated)	-1.72	-0.458
	(8.452)	(3.438)
OLSPs (un-regulated)	3.305	-2.311
	(4.590)	(2.686)
Number of observations	1299	1309
Pseudo R^2	0.125	0.096
Bic	2035.053	4390.319

Notes and sources: Observations are weighted. Marginal values are reported. * denotes significant at 10 per cent, ** at 5 per cent and *** at 1 per cent. Source: Survey of Legal Service Providers.

Table 4: Combined models for ideation and codification: CMP models

	(1) Innovation sales	(2) Diversity of innovation
A. Codification	b/se	b/se
Proportion of ideas externally generated	0.306**	0.433***
	(0.155)	(0.138)
Activity-specific practices		
Research conducted in house	9.366**	15.419***
	(4.298)	(3.578)
Research conducted externally	-17.312***	-5.462
	(5.886)	(4.585)
Multifunctional working – codification	0.633***	0.772***
	(0.081)	(0.071)
Team-working – codification	0.262***	0.259***
	(0.063)	(0.059)
Collaboration – suppliers	14.250*	13.484**
	(7.374)	(6.214)
Collaboration – clients	-13.740*	-13.570**
	(7.136)	(6.345)
Collaboration – professional association	27.686***	4.134
	(8.491)	(7.235)
Collaboration – consultants	1.124	12.885**
	(7.361)	(5.991)
Collaboration – technology suppliers	9.721	13.520**
	(7.742)	(5.582)
Collaboration – regulators	-7.804	5.966
	(9.147)	(8.193)
Activity-spanning practices		
Invested in new IT	6.771*	7.415**
	(3.918)	(3.347)
Non-lawyer owned	9.377**	9.232**
	(4.532)	(3.978)
Leadership for new ideas in place	11.351**	12.125***
	(4.656)	(3.932)
Processes in place	1.7	5.141
	(4.233)	(3.712)
Rewards In place	-1.515	5.285
	(4.434)	(4.242)
Environment variables		
Lack of expertise – signif. barrier	-4.428	-2.707
	(4.799)	(4.938)
Controls		
Employment in 2012	-0.045**	0.001

	(0.021)	(0.020)
Employment in 2012 squared	0.000	0.000
	(0.000)	(0.000)
Age of the enterprise	-0.339**	-0.145
	(0.160)	(0.134)
Facing regional competition	-3.101	4.623
	(13.115)	(9.006)
Facing national competition	11.455	9.168
	(12.958)	(9.002)
Facing international competition	9.066	7.808
	(13.912)	(11.279)
Barristers' chambers	2.864	0.403
	(7.029)	(6.005)
OLSPs (regulated)	-2.583	0.21
	(8.648)	(6.710)
OLSPs (un-regulated)	3.27	0.282
	(4.627)	(4.196)
B. Ideation		
Activity specific variables		
Multifunctional working	0.188***	0.182***
	(0.068)	(0.071)
Collaboration – suppliers	9.081*	9.615**
	(4.739)	(4.814)
Collaboration – clients	32.150***	32.426***
	(5.249)	(5.284)
Collaboration – competitors	10.508***	10.711***
	(3.910)	(3.968)
Collaboration – consultants	6.136	5.613
	(4.234)	(4.340)
Collaboration – professional associations	11.916***	10.754***
	(3.919)	(3.985)
Collaboration – accountants	4.524	4.269
	(4.213)	(4.291)
Collaboration – technology suppliers	22.356***	22.837***
	(4.356)	(4.525)
Activity-spanning practices		
Non-lawyer owned	9.854**	9.492**
	(3.920)	(3.873)
Info demands by regulators (negative effect)	-5.834	-6.284*
	(3.588)	(3.631)
Legislation (negative effect)	5.253*	5.550*
	(2.980)	(3.001)
Finance significant barrier	6.336*	6.125*
	(3.410)	(3.432)

Market opportunities significant barrier	-3.481	-4.647
	(3.822)	(3.836)
Lack of collaborators significant barrier	9.146*	10.393*
	(5.419)	(5.573)
Controls		
Employment in 2012	0.017**	0.016**
	(0.008)	(0.008)
Barristers' chambers	-4.694	-4.679
	(5.546)	(5.610)
OLSPs (regulated)	-5.276	-4.953
	(5.921)	(5.956)
OLSPs (un-regulated)	1.789	2.14
	(3.897)	(3.845)
Number of observations	1366	1366
Equation χ^2	223.085	808.214
Bic	3674.894	3799.442

Notes and sources: Observations are weighted. Marginal values are reported. * denotes significant at 10 per cent, ** at 5 per cent and *** at 1 per cent. Source: Survey of Legal Service Providers.

Table 5: Summary of estimation results for ideation

	Single Equation Tobit	CMP Innovation sales	CMP Diversity of innovation
Activity-specific practices			
Multifunctional working	+	+	+
Collaboration – suppliers	+	+	+
Collaboration – clients	+	+	+
Collaboration – competitors	+	+	+
Collaboration – consultants	(+)	(+)	(+)
Collaboration – professional associations	+	+	+
Collaboration – accountants	(+)	(+)	(+)
Collaboration – technology suppliers	+	+	+
Activity-spanning practices			
Non-lawyer owned	+	+	+
Info demands by regulators (negative effect)	-	(-)	-
Legislation (negative effect)	+	+	+
Finance significant barrier	+	+	+
Market opportunities significant barrier	(-)	(-)	(-)
Lack of collaborators significant barrier	+	+	+
Controls			
Employment in 2012	+	+	+
Barristers' chambers	(-)	(-)	(-)
OLSPs (regulated)	(-)	(-)	(-)
OLSPs (un-regulated)	(+)	(+)	(+)

Notes: Table is based on Tables 2, 3 and 4. '+' denotes a significant positive coefficient, '-' a significant negative coefficient, (+) an insignificant positive and (-)' an insignificant negative coefficient.

Table 6: Summary of estimation results for Codification

	Single Equation Tobit	Single Equation Tobit	CMP Estimator	CMP Estimator
	Innovative Sales	Diversity of innovation	Innovative Sales	Diversity of innovation
Proportion of ideas externally generated	+	+	+	+
Activity-specific practices				
Research conducted in house	+	+	+	+
Research conducted externally	-	(+)	-	-
Multifunctional working – codification	+	+	+	+
Team-working – codification	+	+	+	+
Collaboration – suppliers	+	(+)	+	+
Collaboration – clients	-	-	-	-
Collaboration – professional assoc.	+	(-)	+	(+)
Collaboration – tech. suppliers	(+)	+	(+)	+
Collaboration – regulators	(-)	+	(-)	(+)
Activity-spanning practices				
Invested in new IT	+	+	+	+
Non-lawyer owned	+	+	+	+
Leadership for new ideas in place	+	+	+	+
Processes in place	(+)	+	(+)	(+)
Rewards In place	(-)	(+)	(-)	(+)
Lack of expertise – signif. barrier	(-)	(+)	(-)	(-)
Controls				
Employment in 2012	(-)	+	-	(+)
Employment in 2012 squared	(-)	-	(-)	(-)
Age of the enterprise	-	-	-	(-)
Facing regional competition	(-)	(+)	(-)	(+)
Facing national competition	(+)	(+)	(+)	(+)
Facing international competition	(+)	(-)	(+)	(-)
Barristers' chambers	(+)	-	(+)	(+)
OLSPs (regulated)	(-)	(-)	(-)	(+)
OLSPs (un-regulated)	(+)	(-)	(+)	(+)

Notes: Table is based on Tables 2, 3 and 4. '+' denotes a significant positive coefficient, '-' a significant negative coefficient, (+) an insignificant positive and (-)' an insignificant negative coefficient.

Annex 1: Defining the legal services sector

There are different perspectives on the scope of the legal services sector. The UK's Legal Services Act of 2007, for example, lists six reserved activities which can be provided only by authorised persons (the exercise of the right of audience; conduct of litigation; conveyancing; probate; notarial activities; administration of oaths). These reserved activities, however, form only a small part of what might be thought of as the Legal Services Sector which also includes the provision of advice, assistance or representation in connection with the application of the law and the resolution of disputes determining the nature of a person's legal rights or liabilities. These activities can be undertaken by consumer facing organisations such as the Citizens Advice Bureau (CAB), the Community Legal Advice Centres (CLACs), charities such as Age UK, trades unions, and business facing organisations such as professional business advisers such as accountants and investment banks. This diversity of consumer and business facing organisations suggests a broad definition of the Legal Services sector which includes (Rickman and Anderson, 2011): 'suppliers of legal services include the private bar, lawyers in government employment, and those working for non-profit organisations. In addition, there are many organisations and individuals who work with the law, with lawyers, or as intermediaries. Broadly defined, these stakeholders make up the legal services industry'.

For many of these consumer and business facing organisations, however, the provision of legal services is only a small part of their activity. This means that innovation in these organisations may be driven – ether wholly or predominantly – by factors outside the legal services arena. It also means that some or all of the barriers and constraints on innovation are also likely to be outside the sector. Here, therefore we adopt a more focused approach concentrating on those organisations whose *primary business* relates to the provision of legal services. These organisations would be included within the Standard Industrial Classification (2007) 69.1 'Legal activities'. The definition of this is as follows:

> 'This division includes legal representation of one party's interest against another party, whether or not before courts or other judicial bodies by, or under supervision of, persons who are members of the bar, such as advice and representation in civil cases, advice and representation in criminal actions, advice and representation in connection with labour disputes. It also includes preparation of legal documents such as articles of incorporation, partnership agreements or similar documents in connection with company formation, patents and copyrights, preparation of deeds, wills, trusts, etc. as well as other activities of notaries public, civil law notaries, bailiffs, arbitrators, examiners and referees'.

This broad category includes three main groups of legal service providers:

- Barristers at law — members of the legal profession who have been called to the bar
- Solicitors and members of the legal profession qualified to deal with: conveyancing, drawing up of wills, advising clients on legal matters, instructing barristers, etc.
- Other legal services (OLSPs) including patent and copyright agents; other legal activities including the preparation, drawing up and certification activities, the provision of advice regarding patents and copyrights and other legal activities not elsewhere classified such as the activities of notaries, bailiffs, arbitrators, examiners and referees etc.

Annex 2: Variable definitions

Dependent variables	
Proportion of ideas externally generated	The percentage of new services 'typically coming from ideas initially developed outside the organisation'.
Innovation sales	Percentage of sales derived from services which have been newly introduced or improved over the last three years
Diversity of innovation	A scale variable (%) reflecting the percentage of six different types of innovation activity undertaken by the firm (service, processes, strategy, management systems, organisational change, marketing innovation). If an organisation engaged in all six types of innovation activity and 50 if the organisation undertook three different forms of innovation.
Activity-spanning practices	
Research conducted in house	A binary indicator of whether an organisation carried out any in-house research
Research conducted externally	A binary indicator of whether an organisation carried out any external research
Invested in new IT	
Non-lawyer owned	A binary indicator taking value 1 where a firm is either wholly or partially owned by non-lawyers.
Leadership for new ideas in place	A binary variable taking value 1 where an organisation has 'a leadership team which supports new ideas'.
Processes for developing ideas in place	A binary variable taking value 1 where an organisation has 'structured processes to support the introduction of new ideas'.
Rewards for developing new ideas in place	A binary variable taking value 1 where an organisation offers 'rewards or incentives for valuable new ideas'.
Lack of expertise – signif. barrier	A binary variable taking value 1 where 'lack of expertise or capacity' has been a significant constraint on new service development.
Finance significant barrier	A binary variable taking value 1 where 'lack of necessary finance' has been a significant constraint on new service development.
Market opportunities signif. barrier	A binary variable taking value 1 where 'limited market opportunities for new services' has been a significant constraint on new service development.
Lack of collaborators signif barrier	A binary variable taking value 1 where 'a lack of collaborators for developing new services' has been a significant constraint on new service development.
Regulator info requests	A binary variable taking value 1 where 'complying with information requests from a regulator' has had a negative effect on an organisation's ability to develop new services.
Legislation on legal services	A binary variable taking value 1 where 'changes in legislation relating to legal services' has had a negative effect on an organisation's ability to develop new services.

Ideation practices	
Ideation with suppliers, clients etc.	Binary variables taking value 1 where an external organisation has been 'a source of the ideas and information needed for developing new or improved services or how these are delivered'.
Multifunctional working – ideation	A percentage indicator of those occupational groups involved in 'obtaining the ideas and information needed to develop new or improved services or how they are delivered'. Seven occupational groups are identified (Managing partner, Partners and senior fee earners, Associates and junior fee earners, Executives/senior managers (non-fee earning), Para-legal staff, Administrative staff, Marketing staff / bid managers).
Codification practices	
Multifunctional working – codification	A percentage indicator of those occupational groups involved in 'the process of actually developing new or improved services or how they are delivered'. Seven occupational groups are identified (Managing partner, Partners and senior fee earners, Associates and junior fee earners, Executives/senior managers (non-fee earning), Para-legal staff, Administrative staff, Marketing staff / bid managers).
Team-working – codification	A percentage indicator of organisations' agreement with five statements about team-working: Team-working plays a major role in the development of new services and how we deliver them; Our development teams are cross-functional and involve people from different parts of the organisation; Teams operate very independently and are left to get on with solving the problem; Our organisation invests in training in team-working; Our teams often involve clients or suppliers.
Codification with suppliers, clients etc.	Binary variables taking value 1 where an external organisation has been 'involved in the process of actually developing new or improved services or how they are delivered'
Controls	
Employment	Full time employees in the organisation in 2012 (including all partners, managing partners, barristers and directors but excluding management consultants on short term contracts)
Age of the enterprise	Number of years since the enterprise was established
Facing regional competition	A binary variable taking value 1 where the main competition is other regional organisations
Facing national competition	A binary variable taking value 1 where the main competition is other organisations throughout England and Wales
Facing international competition	A binary variable taking value 1 where the main competition is other organisations internationally
Barristers' Chambers	Binary variable taking value 1 if the firm is a barristers' chambers
OLSP - regulated	Binary variable taking value 1 if the firm is a regulated Other Legal Service Provider (OLSP)
OLSP - unregulated	Binary variable taking value 1 if the firm is an regulated OLSP

Table A1: Correlation matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	ext_ideas	1												
2	innovsales	0.28	1											
3	diversity	0.3885	0.3805	1										
4	rd_inhouse	0.1872	0.1529	0.4052	1									
5	rd_external	0.159	0.0284	0.2273	0.2344	1								
6	it_invest	0.1121	0.0788	0.2381	0.1624	0.1446	1							
7	employ	0.1987	-0.0185	0.1401	0.1001	0.1449	0.0649	1						
8	vintage	0.0385	-0.0839	0.0921	0.0731	0.1079	0.0969	0.1938	1					
9	nonlawyerowned	0.0731	0.0968	0.0806	0.0716	-0.0468	-0.033	-0.0387	-0.1081	1				
10	cmpt-_regional	-0.0531	-0.1435	-0.0043	-0.0134	-0.024	-0.0021	-0.1257	0.1094	-0.2194	1			
11	cmpt_national	0.0462	0.1567	0.0456	0.0198	0.0163	0.0498	-0.0224	-0.1149	0.1936	-0.8312	1		
12	cmpt_international	0.0565	0.0313	-0.0042	0.0028	0.0167	-0.027	0.3668	0.0342	0.0118	-0.2856	-0.1471	1	
13	leadership_new ideas	0.1114	0.1082	0.341	0.2221	0.143	0.1809	0.1267	0.1064	-0.0452	0.0781	-0.0265	0.0002	1
14	processes_new ideas	0.1351	0.1182	0.3722	0.2991	0.1801	0.1622	0.1234	0.0828	0.0343	0.0168	0.0141	-0.0015	0.4486
15	rewards_new ideas	0.1281	0.0982	0.3168	0.1928	0.0896	0.1498	0.1369	0.0328	-0.0116	-0.008	0.0251	0.0519	0.2721
16	barrier_expertise	0.0072	0.0357	0.0176	0.0244	-0.0022	-0.0545	-0.0293	0.0049	-0.0617	-0.0088	0.0003	-0.0188	0.0406
17	barrier_finance	0.0185	0.0333	0.0786	0.0395	0.0054	-0.005	-0.0393	-0.0045	0.004	0.0466	-0.0392	-0.0591	0.0638
18	barrier_mkt_opps	-0.0712	-0.0708	-0.0215	-0.0697	-0.0317	-0.0144	-0.0118	0.014	-0.0385	0.0581	-0.0427	-0.0276	0.0453
19	barrier_collaboration	0.0288	0.051	0.035	0.0123	0.0237	-0.0014	-0.0303	-0.0428	-0.0439	0.013	0.0089	-0.0329	-0.0079
20	negative_regulator	-0.0037	-0.008	0.0343	0.0614	0.0401	0.0025	0.0283	0.0719	-0.0842	0.0419	-0.0239	-0.015	0.0437
21	negative_legislation	0.0339	0.0243	0.0173	0.047	0.0085	0.0415	-0.0245	0.0255	-0.0574	0.0818	-0.0401	-0.071	0.0712
22	codif_multif	0.415	0.3237	0.5987	0.3315	0.1539	0.1754	0.1428	0.1072	0.0527	-0.012	0.015	0.0447	0.2217
23	codif_teamwork	0.2619	0.2081	0.5257	0.3086	0.2579	0.1728	0.1819	0.1303	0.0391	-0.0383	0.0452	0.0522	0.2156
24	codif_collab_suppliers	0.2424	0.1995	0.337	0.1781	0.1831	0.1311	0.0521	0.0369	0.0699	-0.0448	0.0542	0.029	0.0739
25	codif_collab_clients	0.283	0.1839	0.3493	0.2211	0.2425	0.1266	0.0964	0.0583	0.0449	-0.1014	0.0831	0.0681	0.1297
26	codif_collab_prof.assoc	0.2212	0.2329	0.3122	0.1966	0.1956	0.1033	0.0438	0.0456	0.0295	-0.0304	0.0275	0.0146	0.0809
27	codif_collab_tech	0.2952	0.2402	0.4234	0.2125	0.234	0.1894	0.0842	0.0769	0.0415	-0.044	0.0644	0.006	0.1122
28	codif_collab_regulator	0.1808	0.1673	0.316	0.1421	0.1356	0.0897	0.0098	0.0522	-0.0137	-0.0371	0.0501	-0.0085	0.0737

29	idea_collab_suppliers	0.4092	0.2159	0.385	0.1934	0.1944	0.1189	0.0812	0.0189	0.0184	-0.0409	0.0607	0.0186	0.1053
30	idea_collab_clients	0.5386	0.2764	0.5141	0.297	0.2015	0.1394	0.1254	0.0534	0.0688	-0.092	0.0926	0.0513	0.1795
31	idea_collab_comp	0.4512	0.2246	0.4411	0.2817	0.1496	0.1187	0.042	0.0466	0.0725	-0.0098	0.0439	-0.0132	0.156
32	idea_collab_consults	0.3365	0.216	0.4779	0.2228	0.2137	0.1248	0.1407	0.0667	-0.0009	-0.0121	-0.0019	0.0675	0.1496
33	idea_collab_prof.assoc	0.4378	0.2434	0.4557	0.263	0.1649	0.1193	0.0401	0.0657	0.0792	-0.0557	0.0556	0.025	0.1423
34	idea_collab_accounts	0.3959	0.199	0.4712	0.2291	0.1506	0.1538	0.0444	0.0317	-0.0318	0.0393	-0.0166	-0.0272	0.1722
35	idea_collab_tech	0.4807	0.2836	0.4987	0.2591	0.2245	0.2078	0.0853	0.0646	0.0526	-0.0489	0.0677	0.012	0.1516
36	multif_ideation	0.3778	0.3015	0.5844	0.3101	0.1478	0.1746	0.093	0.0971	0.0422	0.0011	-0.0008	0.0583	0.2178
37	barristers	-0.034	-0.0328	-0.0281	0.0006	0.017	-0.0677	-0.0034	0.0746	0.0328	-0.0638	0.0451	0.0079	-0.0541
38	otherreg	-0.0379	0.0232	-0.0211	-0.0076	-0.0286	0.06	-0.0286	-0.0004	0.0969	-0.1189	0.1252	0.0028	-0.1046
39	otherunreg	0.0248	0.0787	-0.0067	-0.0027	-0.0246	-0.0573	-0.0595	-0.0974	0.4215	-0.1053	0.0619	0.01	-0.173

		14	15	16	17	18	19	20	21	22	23	24	25	26
14	processes_new ideas	1												
15	rewards_new ideas	0.362	1											
16	barrier_expertise	-0.0361	-0.0136	1										
17	barrier_finance	0.059	-0.0439	0.2612	1									
18	barrier_mkt_opps	0.0105	-0.0126	0.187	0.1527	1								
19	barrier_collaboration	0.0457	0.0205	0.221	0.1805	0.2078	1							
20	negative_regulator	0.1076	0.0441	0.0796	0.1001	0.0762	0.0696	1						
21	negative_legislation	0.0508	-0.0505	0.0843	0.1223	0.0711	0.0428	0.2445	1					
22	codif_multif	0.2807	0.2655	0.0194	0.043	-0.049	0.0285	0.0048	0.0201	1				
23	codif_teamwork	0.2811	0.2191	-0.0245	0.0227	-0.0568	0.0377	-0.0095	-0.0356	0.5057	1			
24	codif_collab_suppliers	0.1066	0.0955	0.0038	-0.0036	-0.0351	0.0013	0.0346	-0.0071	0.2587	0.3279	1		
25	codif_collab_clients	0.1569	0.1332	-0.03	-0.0267	-0.0405	-0.003	0.027	-0.0039	0.302	0.3772	0.535	1	
26	codif_collab_prof.assoc	0.1567	0.1479	0.0301	0.0282	-0.0121	0.0201	0.0484	0.0375	0.261	0.2823	0.3838	0.5241	1
27	codif_collab_tech	0.1504	0.0932	0.0228	0.0079	-0.0445	0.0253	0.0355	-0.0157	0.3643	0.4338	0.6688	0.5958	0.4995
28	codif_collab_regulator	0.1333	0.1078	-0.0294	-0.0038	-0.0254	0.0066	0.023	-0.0157	0.2308	0.3081	0.3974	0.5094	0.5713
29	idea_collab_suppliers	0.1379	0.1711	0.0162	-0.0041	-0.0141	0.0361	0.0084	0.0081	0.4046	0.3124	0.3932	0.2771	0.2109
30	idea_collab_clients	0.206	0.1871	-0.032	0.0151	-0.034	0.0091	0.004	-0.0409	0.5716	0.4421	0.3084	0.4741	0.2802

31	idea_collab_comp	0.1873	0.1499	-0.0023	0.02	-0.0268	0.0383	0.0425	0.0151	0.4783	0.3527	0.302	0.3305	0.2499
32	idea_collab_consults	0.222	0.1603	0.0024	0.0114	-0.0134	0.0443	0.0068	-0.0099	0.4531	0.4249	0.318	0.352	0.3387
33	idea_collab_prof.assoc	0.1988	0.1904	0.012	0.0025	-0.0254	0.0158	-0.0066	0.0261	0.439	0.3579	0.2508	0.331	0.3947
34	idea_collab_accounts	0.1995	0.1875	-0.0395	-0.0019	-0.0329	0.0113	-0.0062	-0.0038	0.4383	0.3926	0.2893	0.3231	0.2858
35	idea_collab_tech	0.2193	0.1648	-0.015	-0.0047	-0.0513	0.0095	0.0273	0.0192	0.4542	0.3938	0.3944	0.3864	0.3814
36	multif_ideation	0.2516	0.2663	0.0073	0.0318	-0.0605	-0.0032	-0.0088	0.0164	0.8602	0.4765	0.2231	0.2643	0.2185
37	barristers	0.0021	-0.0638	-0.0932	0.0604	-0.0384	-0.0202	-0.0414	-0.0464	0.0069	0.0658	-0.0159	0.0233	-0.0093
38	otherreg	-0.0693	-0.0112	-0.0614	-0.0758	0.018	-0.0167	-0.0121	-0.0266	-0.022	-0.0354	-0.0287	-0.0167	-0.0004
39	otherunreg	-0.0746	-0.0464	0.0127	0.0187	-0.0102	-0.0137	-0.0887	-0.0671	-0.0011	-0.0194	-0.0136	-0.0137	0.0548

		28	29	30	31	32	33	34	35	36	37	38	39
28	codif_collab_regulator	1											
29	idea_collab_suppliers	0.4759	1										
30	idea_collab_clients	0.3222	0.1908	1									
31	idea_collab_comp	0.375	0.2905	0.4757	1								
32	idea_collab_consults	0.3378	0.215	0.4542	0.6471	1							
33	idea_collab_prof.assoc	0.4001	0.3131	0.3784	0.4388	0.3725	1						
34	idea_collab_accounts	0.3138	0.2836	0.4391	0.5293	0.5308	0.4294	1					
35	idea_collab_tech	0.3805	0.2802	0.4455	0.5415	0.4675	0.519	0.4601	1				
36	multif_ideation	0.5112	0.3145	0.5794	0.5211	0.5173	0.4848	0.5356	0.5871	1			
37	barristers	0.331	0.2028	0.4022	0.5564	0.4695	0.4268	0.4469	0.4137	0.4128	1		
38	otherreg	-0.0083	0.0494	0.0015	0.0057	-0.0004	-0.0439	-0.0352	-0.0221	-0.0178	-0.0089	1	
39	otherunreg	0.0087	-0.0071	-0.015	0.0175	0.0002	-0.057	0.0507	-0.0248	-0.0166	-0.0286	-0.0688	1

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