

# Information-Intensive Operations-Based Service Process Classification

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## Abstract

This paper attempts to extend our understanding of service operations in the advent of virtual services. Through analysis of the central aspects of the service delivery process and extant service classification literature, the paper introduces a service provider-customer input-based service classification. Empirical breakdown of a number of service processes to their constituent parts suggests that for a service classification to be complete it ought to consider the actions and input of the service provider and of the customer. Additionally, it is suggested that there are different variants of information-intensive services. The findings point towards emergent high-potential research areas in service operations management.

## Keywords

Service Delivery Process, Service Classification, Information Intensive Service Operations

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## 1. Introduction

The importance of classifying services, albeit from multiple standpoints, including economic, strategic positioning, challenges, productivity, efficiency, and quality is well-founded in operations management (OM) literature (see for example Shafti et al., 2007; Xudoyberdiyeva, 2019; Cook et al., 1999; Van Der Valk & Axelsson, 2015). However, these service classification schemes have limitations (Verma, 2000) and gaps that could be filled by varying the unit of analysis from organisational to process level (Wemmerlöv, 1990; Sampson & Froehle, 2006). Winch (2014: p. 725) posits that "...relatively small units of analysis with focused research questions can yield insights which might not be available to researchers deploying more intensive ... naturalistic methods". Frei and Harker

(1999) observed the worth of understanding the specific activities of the transformation process in measuring the efficiency of the service delivery system. A number of recent studies recommend an end-to-end process view of services (Menor & Johnson, 2012; Ponsignon et al., 2007). According to the Unified Service Theory (UST) (Sampson & Froehle, 2006), a service is a process such that the customer (ultimate service consumer) supplies the service providing entity some input that then the entity uses amongst other resources to meet the needs of the same customer (Sampson et al., 2010). This connotes that studying a service process as a unit of analysis may yield rich insights. In addition, evaluating the combined implication of the consumption act, the specific recipient of the service process, vis-à-vis the role of the service provider, the nature of input transformed and the emergent information intensity (Chase & Apte, 2007) dimension from a service process level could extend knowledge and understanding of the extant service classifications. Indeed, extant service literature in the discipline of operations management predominantly looks at classification from either customer processing or material processing lenses, with limited attention accorded to informational and emergent virtual perspectives. This paper attempts to address the question of information intensiveness of a service process in relation to the combined consumption act of the customer and the service processing action in an attempt to better understand service classification. The paper seeks to provide answers to the following questions: What are the important service process design features of information-intensive services? What is the implication of these features along with the role of the specific service process recipient and the nature of input processed to service classification?

The paper begins with a review of general literature about service delivery systems and service classification from an operations management perspective. Next, the methodological approach adopted to develop the tentative service typology and findings are highlighted, followed by discussions and conclusions.

## 2. Literature Review

### 2.1. Service Delivery Process

The service delivery process is the means to the realisation of service value through technology (Kingman-Brundage, 1991). Process strategy comprises the way organizations compete through effective and efficient utilisation of resources, process changes and adjustments, customer handling, and vertical integration (Russell & Taylor, 2003). Management disciplines such as marketing and operations management (OM) have addressed service delivery process design decisions from multiple outlooks. Marketing researchers are concerned with designing product or service exchange systems that support information sharing and customer satisfaction to win and retain customers. Operations Management looks at manufacturing processes; flexibility of production equipment, assembly, and customization technologies while its sub-branch service operations management highlights the distinguishing features of service designs in high-to-low

customer contact systems, focusing on infrastructural and structural elements at highly generic levels (Chase, 1978; Johansson & Olhager, 2004; Quinn, 1992; Roth & Menor, 2003; Tax & Stuart, 1997). Infrastructural resources involve the “soft” behavioural or people aspects of the service delivery system including employee skills, employee discretion/empowerment, hiring, and training whereas structural resources involve the hardware aspects of the service delivery system including technology, facility layout, facility location, and equipment. In an attempt to better understand service delivery processes, the specific service dimensions relevant to this study are discussed next.

### 2.1.1. Infrastructural Resources

Three people aspects; employee skills, employee discretion and employee hiring/training, of the service delivery process are reviewed in this section. Employee skills and knowledge are operant resources (Constantin & Robert, 1994) used to transform other resources. The customer contact model (CCM) (Chase, 1978) categorises employee skills according to technical complexity dimension; skills used at the back office (BO) are referred to as technical skills while those utilised at the front office (FO) are termed interpersonal skills. Other skills termed as diagnostic cut across the back-front office (BO/FO) configuration and entail experience and knowledge necessary for decision making. Requisite employee skill levels in a service system may be measured on a high-low continuum scale. For instance, knowledge and professional services are distinguished from other services by the level of skills utilised during service delivery (Miles et al., 1995). Educational qualifications such as college degree, diploma, certificate and high school level achieved may represent surrogate measures of employee skill levels. Employee discretion is defined in terms of choices made by employees in developing optimal procedures for undertaking tasks (March & Simon, 1958). It is the level of personal judgement allowed to employees during their work (Rolfe, 1990). Employee discretion is not only related to the concept of employee empowerment (Kelley, 1993) but is an important service design dimension (Silvestro et al., 1992). However, its implications to service operations practice are still unclear (Bowen & Lawler III, 1995). It may be measured by evaluating the degree of personal judgement allowed to employees executing different service processes. This could be realised by answering the question—“*do employees follow pre-conceived decision making templates, do they escalate decisions to supervisors or seniors or to what extent they make decisions?*”

Schmenner (1986) considered hiring and training of employees as one major challenge facing service operations managers. Roth and Menor (2003) suggested that this infrastructural question ought to be addressed through carefully crafted virtuous cycle. Hiring is the process whereby right employees are identified and selected for employment before commencement of requisite training. Kellogg and Nie (1995) suggest that different service processes demand distinct kinds of hiring and training procedures. For instance, hiring and training for business

process outsourcing firms is unique because process tasks are undertaken as service delivery happens (Bhasin, 2011). To successfully deliver such services for every newly secured client, employees are contracted and trained. Hiring entails screening potential employees in-house or delegating to third party firms whilst training may involve interdisciplinary tasks, interpersonal skills or repetitive versus skill based tasks.

### 2.1.2. Structural Resources

This section looks at hardware aspects; technology, facility layout and facility location, of the service delivery process relevant to the extant study. According to Levitt (1976), services are industrialised using hard, soft or hybrid technologies. The mix of technologies requires different combination and organisation of people, machinery, tools and procedures, connoting complexity of services and level of quality of service delivery. Perrow (1970) suggested that complex services have high degree of task variability and little analysability. Service complexity is defined in terms of the number of steps or activities that make up the end-to-end service process (Hill, 2005) or process DNA concept suggested by Sampson et al. (2010). Technology is measured on the basis of whether it is designed to deliver effective or efficient services (Kellogg & Nie, 1995) or in terms of process automation; labour vis-à-vis equipment. Facility layout relates to FO/BO decoupling decision whereby high customer contact service systems are laid out for different objectives from low customer contact systems. This construct may be evaluated by answering the questions; “*what is the motivation behind facility arrangement and set-up?*” and “*does layout take customer or internal outlook?*” Lastly, facility location decision considers proximity of the service delivery system to customers, labour, infrastructure and centralisation or decentralisation concept. It requires evaluating where service processing takes place and why it matters to clients.

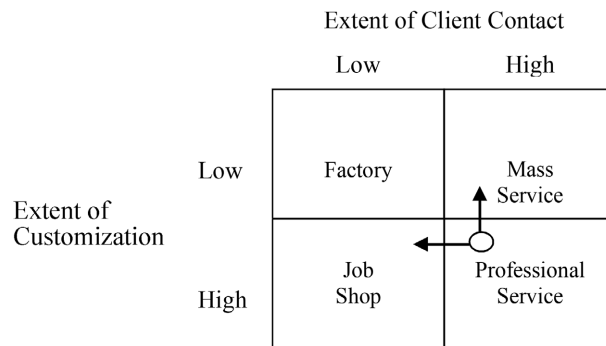
## 2.2. Constructs of Service Classification

The use of typologies and taxonomies is not new to operations management (see for instance: Boyer et al., 2000; Bozarth & McDermott, 1998). Although the difference is not very clear, different authors have made attempts to distinguish typologies from taxonomies. Miller (1996) explained that typologies are conceptually derived (Stock & Tatikonda, 2000) whereas taxonomies are derived empirically. However, Boyer et al. (2000) disagree and term this a misconception. They argue that the difference lies in the objectives such that ‘taxonomies provide comprehensive classification systems [including “good” and “bad” phenomena] while typologies only describe ideal types’ (Boyer et al., 2000: p. 603). Generally though, it is unclear how typological configurations should be developed. Miller (1996) observes that although there are no guidelines for developing typologies, three features are worthy emulating; i) typologies should be founded on strong theoretical foundations, ii) typologies should make contribution to knowledge, and that iii) the categorising constructs should be coherent and provide norma-

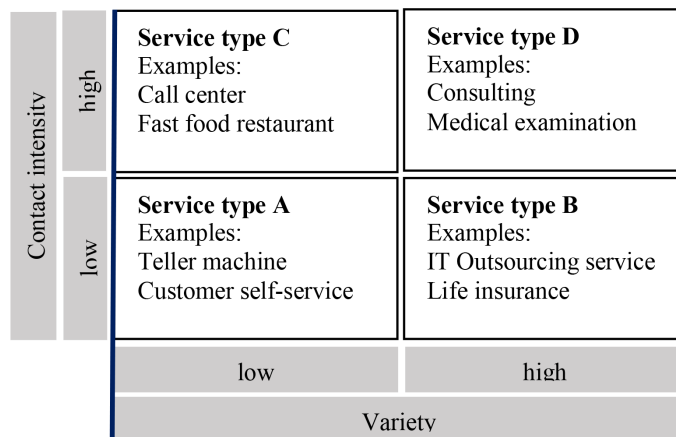
tive outcomes. OM literature encompasses insightful service classification schemes that are based on constructs such as customer contact, service standardization, customization, employee discretion, FO/BO configuration, service complexity and criticality, knowledge embeddedness amongst many others. To illustrate, in a study of relationship between firms and clients mediated by brokers, **Maister and Lovelock (1982)** identified customization and customer contact as important factors in classifying such services, **Figure 1**. Similarly, **Fährnich et al. (1999)** in an empirical study that used factor analysis identified intensity of customer contact and variety of the service products, **Figure 2**, as the most important service classification attributes (**Bullinger et al., 2003**).

These two typologies are alike for the reason that the variety dimension in **Fährnich et al. (1999)** connotes standardization-customization service spectrum in **Maister and Lovelock (1982)**. **Fährnich et al. (1999)** give more weight to intensity of interaction between the customer and the service provider employee than to contact time. It is evident that services, such as the call centre (**Figure 2**), classified under service type C, are high in indirect customer contact but low in variety and qualify as information intensive services (IIS) (**Apte & Mason, 1995**).

Two-by-two matrices as suggested by **Lovelock (1983)** provide informative typological insights through identification of service offerings that fit in each of



**Figure 1.** Service classification (**Maister & Lovelock, 1982**).



**Figure 2.** Service classification (**Fährnich et al., 1999**).

the four cells and thus provide supplemental information (Marshall, 1996). Traditional service classification schemes are predominantly centred on standardisation-customisation continuum (Bitner et al., 1997; Kellogg & Nie, 1995; Zomerdijk & Vries, 2007) albeit through synonyms such as service variety (Bullinger et al., 2003; Fähnrich et al., 1999; Maister & Lovelock, 1982), service routineness (Wemmerlöv, 1990) and repeat versus non-repeat services (Hill, 2005). A number of dimensions for IIS categorisations are also found in literature. For instance, Youngdahl and Ramaswamy (2008) suggest that two service process delivery characteristics; a) customer contact, and b) knowledge embedded in a service process could highlight the value that outsourcing customers derive from outsourcing arrangements. They develop two service classes; transactional services and solution services. Transactional services represents simple, basic and easy to undertake FO/BO tasks such as payroll processing and telemarketing. Solution services are core to organization strategy and include supply network design and managerial decisions, research and development, branding and so on. This echoes the suggestion by Tinnilä and Vepsäläinen (1995) that the driving factor in classifying information intensive services is the value of the service as perceived by the consumer of that service, meaning the degree of idiosyncrasy of the service to the consumer. The challenge though is that service classifications that are developed from these dimensions are broad and classify services at industry or firm level (see for instance, Collier & Meyer, 1998; Schmenner, 1986).

This literature review has highlighted the soft and hard aspects, at the heart, of the service delivery process as well as the predominant service classification constructs of OM. It is evident that the construct of information intensiveness has been ignored or at most looked at sparsely. Equally, there are many calls and justification for study of services from a process level and a lot has been done. However, service classification at process level squeals for study.

### 3. Methodology

Since the IIS phenomenon is not adequately addressed in literature nor are the underpinning theories developed, the aim of the paper is to develop insightful theory and open avenues for future studies. OM scholars consent to the many calls to undertake research within business settings, so as to develop theories that are of practical use (Boyer & Swink, 2008; Brown, 2012; Roth, 2007). Case study research design was deemed appropriate because the main research question meets conditions necessary for case method (Yin, 2009), the question explores the emergent phenomenon of IIS and that the control, of the researcher, over behavioural events is in the ex post facto manner. This paper undertakes an in depth multiple-case analysis of the contemporary IIS in three Information Technology Enabled Services (ITES) firms<sup>1</sup>; hereby referred to as EVEREST, GIGAS and HUMONGOUS. The three were deemed sufficient as this would al-

<sup>1</sup>The real names of these firms have been disguised for ethical reasons.

low exploration of pattern convergences or dissonance across cases.

### 3.1. Towards a Process Level Service Classification

Since call centre services consist one of the major IIS, an evaluation of the service delivery process that delivers call centre service was conducted by way of process chain network (PCN) diagram (Sampson, 2012b), Figure 3. Observation of the PCN revealed two important service operations features. First, the interactive voice response (IVR) receives informational customer inputs and fully resolves customer queries by way of providing the caller with information, implying an informational exchange process. Second, queries that may not be resolved through IVR, meaning those that are technical and requiring detailed information and explanations, are escalated to technical support team in form of informational customer inputs.

This observation raises the question; “*why the difference in delivery of service(s) offered through the same process?*” The difference, it is supposed, may be explained by the distinctive service *consumption act* and *nature of input processed* in each operational process activity. Whereas in both activities the service provider processes information, through the IVR the needs of the consumer (caller) are satisfied when the sought-after information is received whereas in the escalated cases, the caller requires knowledge (more than information). Sensitized by this inspiring revelation, a typology (see Section 3.2) grounded on the actual happenings in empirical context is established to help pick cases that are not only information rich but also capture service diversity. To develop a conceptual

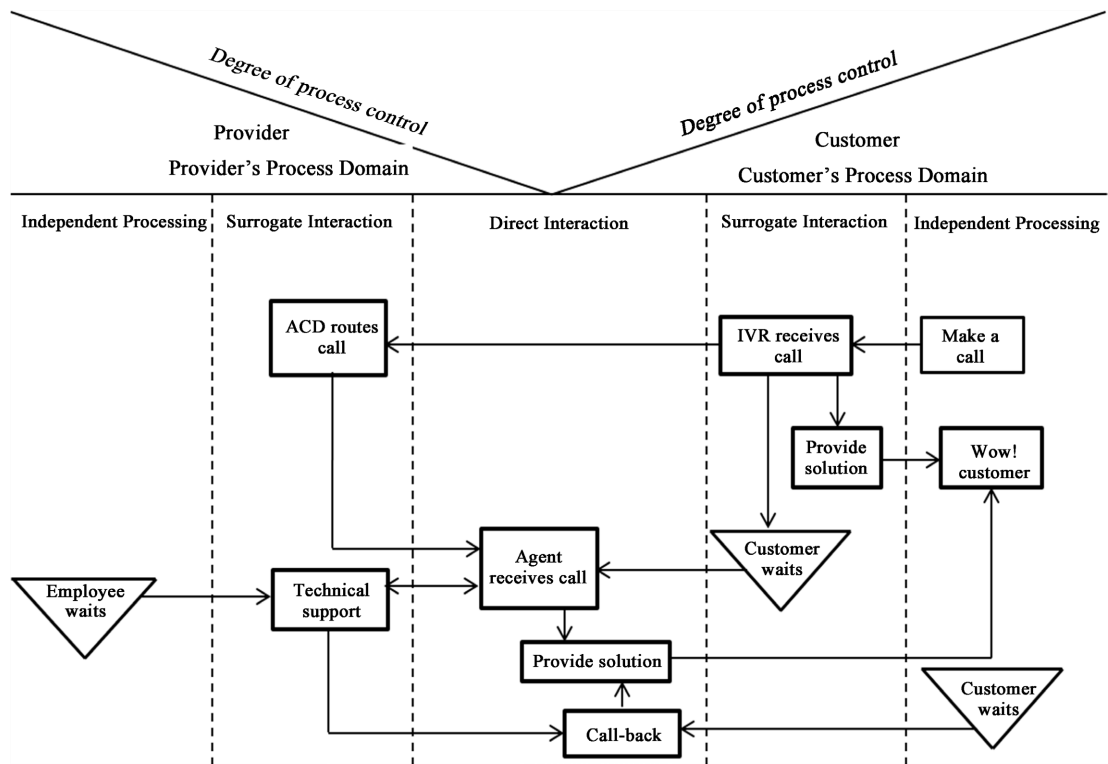


Figure 3. PCN diagram for call centre service process.

typology, the scope of IIS should be understood. The PCN diagram suggests that micro-level aggregations are better because they might provoke innovation at process level rather than just enable location of services within industries (Cook et al., 1999; Reimann, 1980; Wemmerlöv, 1990). This approach relates well with the observation that ‘... the term “operations” is more closely aligned with the “processes” of the firms than the products of firms’ (Sampson, 2012b: p. 183). Service at process level is defined by; i) value adding actions of the service provider which could be physical, informational, or interpersonal transformations (Apte and Mason, 1995); and ii) the direct recipient of the service that could be customer’s body or mind, possessions, or information (Haksever, 2013; Lovelock, 1983; Sampson & Froehle, 2006; Wemmerlöv, 1990). Indeed, Morris and Johnston (1987) and Wemmerlöv (1990) suggested that service processes handle either physical items, people, or information. However these three inputs do not preclude each other from the transformation process but for ease of global disaggregation, the informational aspect has to be largest (Apte & Mason, 1995). Apte and Karmarkar (2007) suggest that those service processes that utilise significant amount of delivery time processing information and are low on people and physical items processing are good candidates for disaggregation. Apte and Mason (1995) posit that the lower the customer contact in a given process, be it in-person or symbolic contact, the easier it is to use information technology to deliver such a process. They argue that physical presence which relates to time spent on physical object manipulation limits global colocation. According to Bitner et al. (1997), the degree of participation of the customer explains the level of service customization. This is at best a partial explanation because low or even lack of customer participation does not mean absence of surrogate customer inputs, such as customer information or customer property. Actually, different customer input surrogates require different service delivery processes and consistent with the UST, it is hereby suggested that full understanding of customer inputs is necessary antecedent for the service customization decision (Sampson & Froehle, 2006). The role of the customer in service transformation process is two dimensional; i) customers as suppliers of inputs into the processes and, ii) as recipients of the process’s outputs (Sampson, 2000). Customers do not only supply own bodies, minds, belongings, or information as inputs to the service process (Lovelock, 1983; Sampson & Froehle, 2006; Wemmerlöv, 1990), but are recipients of output from the service process. Customers receive the output through their bodies, minds, possessions, or information (Haksever, 2013; Hill, 1977; Lovelock, 1983). These different customer aspects require different ways of service delivery as explained by the heterogeneity dimension of services.

### 3.2. Data Collection

Considering this study is situated within the confines of IIS, a hypothetical two-by-two typology (Table 1) is developed, providing a summary of services that fall within service provider informational input vis-à-vis customer informational



**Table 1.** Service provider-customer informational input typology.

		Consumption Act	
		Mind	Information
Processing Act	Informational	Research	Data entry
	Customer	Training	Inbound call centre

input. This paper adopts case study research design at a process level in settings that are not static and the investigator varies data collection as new ideas emerge (Benbasat et al., 1987). A decision on four service process archetypes (research, data entry, training and inbound call centre) to be studied against the service delivery dimensions earlier reviewed is made. All the three case firms offer the four service variants.

Being a multiple-case study design, a case study protocol was used to ensure repeatability of evidence gathering procedure across cases. Yin (2009) asserts that a well-designed case study protocol ensures validity and reliability research. In the first phase prior to commencement of data collection, mapping of the “operate” process (use of PCN diagram) for each service was done to not only capture key activities but enable understanding the *how* of service delivery, *who* undertakes it, *why*, and *what* resources are utilised. This allowed for improvement and adjustment of the initial case study protocol. The second phase entailed gathering generic characteristics and information about the case companies and particular units of analyses. Fifty-two (18 at EVEREST and 17 in each of the other two firms) semi structured interviews were conducted and recorded. The interviewees ranged from senior level management such as the CEOs, middle level managers to operational level staff. Transcription of voice data into text directly followed the interviewing on the same or following day allowing for utmost capture of data in raw form. Each interview comprised 10 - 15 pages of text that eventually resulted into about 600 pages by the end of the process. Supplemental data such as documents and brochures from the firms, websites, and observation of staff at work were also collected.

### 3.3. Data Analysis

The data collected were largely in form of words and required different approaches of analysis from numerical data. The qualitative data collected were analysed at two levels; i) within-case analysis, and ii) cross-case analysis (Eisenhardt, 1989). Intra-case analysis was done at three levels; *data condensation* began with an overview and organisation of data at the end of each interview. As mentioned earlier, some of the data were in form of digital audio records whilst others in form of notes. The audio data were transcribed making all the data soft before printing to physical form that is friendlier for coding. The verbatim “hard copy” transcripts’ data were then code-segmented by relating the a priori determined attributes to each sentence, sentence-by-sentence. This match of sentences to at-

tributes resulted in condensed interview notes specific to the a priori study constructs; *data display* assembles information, through extended text or display such as matrices, tabulations and schematic models, in an ordered and simplified way allowing the investigator to draw conclusions. Matrices were generated to compress emergent issues related to customer inputs and service process features for each service offering; *drawing and verification of conclusions* by logically referring to the observable patterns, the investigator finds and attaches meaning to relationships. The overall strategy entailed searching for patterns based on comparison of cases through PCN diagrams and narration of the 12 (3 cases  $\times$  4 units of analysis). This means, the corresponding service offerings across case firms as well as inter-offering comparisons were done. However, before commencement of cross case analysis, the findings for each construct were synthesised (**Appendix I** provides an illustration of how the construct employee discretion was summarised) in a way that identified patterns and brought out similarities and differences within a particular service offering. Cross-case analysis commenced after the case study respondents had confirmed and approved the final intra-case analyses. Observations relating to various constructs and inherent service attributes of the research study were made. To ensure literal replication, cases that theoretically would be expected to yield similar results were compared. For instance data service case was compared to call centre, and research work to training case. Contrasting cases such as data and research, data and training, research and call centre, and call centre and training were compared to ensure theoretical replication. This approach allowed identification and matching of common as well as contrary patterns for purposes of distinguishing between the four cases and drawing verifiable conclusions.

## 4. Findings

### 4.1. Customer Inputs

From the standpoint of a service provider, to a summative extent, data and research are more information intensive than call centre and training service processes.

‘Without the client sending the files (data), the agents have no work. This is also the case with the call centre, unless a customer makes a call, the agents are free!’—**CEO, Everest**

Data service processes are highly decoupled. Other than sending data to the service provider, client participation is minimal. This enables optimal flow between firms and affords clients ample time to oversee the project. The call centre service process is multi-dimensional, both informational and interactive. The process involves interaction between employees of the service provider and callers. Because of the high number of callers and consequent number of process cycles, call centre has high information volume. Indeed, the process has two solution provision points; the IVR and the agent, most calls are resolved by the

agent and as such call centre service is a high contact service. With respect to the research service process, instructions given to the service provider are relatively equivocal due to the reality that it is not possible to predetermine the research processes let alone the outcome.

‘I am pretty sure; you (in reference to this author) don’t know what the findings of your study will be. Do you?’—**Associate Delivery Lead, Gigas**

Research work is information intense and entails data collection and analysis with minimal number of process cycles. Indeed, other than the client giving instructions, the other activities are undertaken by the service provider. Training case is low in customer information volume due to singular process cycle per project. In terms of intensity, the highest proportion of process time is spent during the interaction rather than in processing information. The core activities in the service process entail direct interaction and as such training is a high contact dyadic service.

#### **4.2. Automation**

Though data processing is largely labour intensive and basic, use of optical and intelligent character recognition processing technologies<sup>2</sup> to convert data from one form to another is common. Experience and ability to convert data files from any format to specific digital format requested by the client is the line between winning and losing a job. These technologies facilitate agents work for efficient delivery of tasks.

‘With access to reliable internet technology, operations can be located anywhere in the world’—**Operations Manager, Humongous**

The research service process is labour intensive but makes use of technology albeit to a small extent. The main technology utilised during the search for information activity and in delivery of research work is the internet. The use of mobile telephones and penetration of internet to remote and rural areas is extensive, in virtually all countries, making marketing research much easier to undertake. Evidence suggests that the service process for inbound call centres is highly automated. The case companies have invested in all-encompassing platforms that provides technologies such as: interactive voice response (IVR) caller-machine where pre-recorded speech of instructions guides the customer through process of answering queries by themselves; automatic call distributor (ACD) technology that facilitates quick assignment of calls to the next available agent based on the call’s category; CRM enables documentation of customer queries so that recurring questions can be addressed in consistent way; Computer Telephony Integration (CTI) facilitates “screen pop” on the agent’s desktop providing him/her with the caller’s history. In addition there are firm specific technologies used to monitor employee performance and support complex workforce scheduling in the call centre. Training service process entailed direct

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<sup>2</sup>OCR & ICR.

contact between trainers and trainees with minimal reliance on technology. The service process is manual but buttressed by generic computer technologies such as Microsoft Office.

### 4.3. Customisation

For the data service process, client influence is high during the set-up stage but drastically reduces during delivery. Indeed, there are projects whereby work is processed in the client's system or the client is allowed to have representative at the site. The clients may have a say on choice of people to perform the tasks and delivery time. Generally, the initial phases of data projects are undertaken online and the client is allowed ample latitude. However, the delivery phase is more closed and largely occurs offline, tending to be homogeneous, repetitive and *routinized*. The service providers adopt the principles of mass customisation. It is observed that for the research service process, the calibre of service employees and operational process systems are important considerations by clients. Although there is evidence of procedure similarity in delivery of research work, clients still ensure specific requirements are incorporated in the design of the research process. Call centre service processes entail co-production (between the client the service provider) and shared design of the service delivery process. This is due to service provider reliance on client information in terms of probable caller queries and answers. There is observable similarity in process execution from caller to caller. The client has significant influence in guiding the entire training service process. The process is influenced by the clients both in conceptualisation and delivery. The process is entirely tailored to the specifications of the clients.

### 4.4. Employee Discretion

A summary of findings relating to employee discretion is attached in appendix 1. In striving to reduce mistakes and enhance efficiency, data service process need minimal, if any, employee discretion. It is a low-skilled routine job where tasks are highly specified and automated. Similarly, employees in call centres have to adhere to strict procedures. The tasks are standardised, scripted and agents are monitored in an effort to avoid risks that may arise from high employee autonomy. The research process work is defined by the client and the researcher has to stick to laid down procedures but in general the process relies on the expertise of the researcher. Training process worker enjoys the most decision making autonomy. The success of the process depends on the trainer's judgement, diligence and prior experience as highlighted below.

‘Willingness to work long hours and ability to use judgement in making sound decisions are key qualities’—**Operations Manager, Gigas**

### 4.5. Interpersonal Skills

Data and research service processes entail the least involvement of the client in

execution of the process and as a result not much interpersonal skills are required. Call centre agents should possess interpersonal skills to enable them resolve and fully explain to the callers issues that may not be resolved through the IVR. Needless to note however, most of these issues are highly homogeneous. The execution of the training service process involves the customer directly and thus the trainer should possess excellent interpersonal skills, effective speaking, listening abilities, emotional intelligence and right attitude.

#### 4.6. Customer’s Role

Processing of data work is not affected by customer’s role because clients supply unambiguous customer inputs in form of instructions. The instructions form the major component of the service level agreement and are realised by well-trained customer service representatives. Once understood, instructions become part of day-to-day operations and are revisited during performance evaluation. The call centre process is triadic with minimal interaction between the call centre firm and the client but high interaction between the callers and the agents. The cycle of information flow into the process occurs severally within given time durations. The client’s participation in the research process is limited and takes place in the first activity of the process, bringing the provider to quick understanding of the project at hand. The volume of customer inputs is low because ordinarily there is one process cycle per research work project. In terms of contact, there is limited participation of the client allowing the service provider to carry out the work at the back office. The training process is interactive with few process cycles, meaning there is low volume of customer information. Since the core activities of training process entail interaction between the two parties, training is a high contact dyadic service. However, the process experiences high customer request variability.

Evidence (Figure 4) shows that highly IIS are processed by employees possessing basic technical, diagnostic and interpersonal skills, agreeing with submissions that such service offerings are highly “commoditized” and “industrialized”

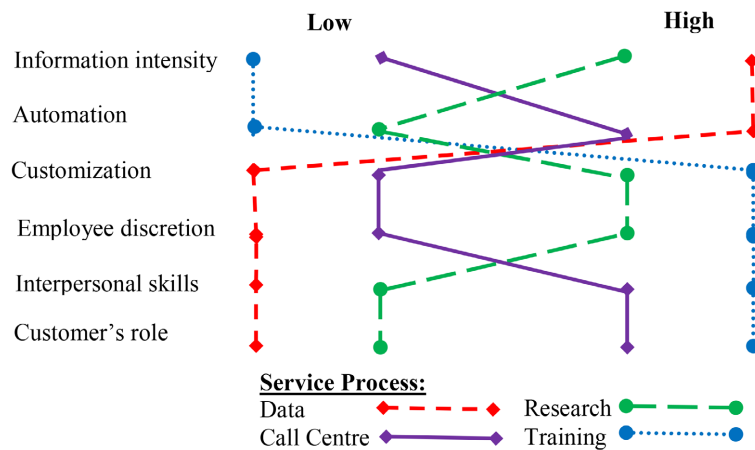


Figure 4. Service process attributes.

(Levitt, 1976). In contrast, non-information intense service processes require employees to possess high technical, diagnostic and interpersonal skills, meaning professional services are polar opposite of “commoditizable” services in all aspects of employee skill requirements. Studies in operations management (Johansson & Olhager, 2004; Kellogg & Nie, 1995) explain these differences through customer contact lenses.

Current evidence suggests that the impact of information intensity is different from that of customer contact. Highly IIS processes exhibit significant employee skill differential that may be explained by the position of the information intensity aspect (research work service process is informational in aspects of the service provider actions whereas call centre service process is informational in customer consumption actions). Processes that entail informational consumption and customer interactive processing are delivered by employees possessing high levels of interpersonal skills but with basic technical and diagnostic skills. On the other hand, service processes that are informational in processing actions but consumed through the mind are processed by employees with high technical and diagnostic skills but low interpersonal skills. This suggests that customer contact may highlight the requisite levels of interpersonal skills in a service process but not the other dimensions of employee skills. It is reasoned herein that; (a) customer contact provides partial explanation of employee skill requirements, and (b) that the remainder is explained by nature of customer consumption act as evidenced by all the four cases. These findings suggest that IIS consumed through the mind are delivered by employees with higher discretion than those consumed as information. This suggests that traditional operations management understanding of customer contact in terms of only what the operations process takes in as input, does not make clear employee discretion requirements.

#### 4.7. Technology

Technology is understood in terms of automation and degree of service routinization. Automation entails execution of tasks by use of machine technology in place of persons (Parasuraman & Riley, 1997). Execution involves active processing of data into information and taking control of the entire task (Lee & See, 2004), enhancing efficiency of operations and boosting realization of advantage over competitors (Adam & Swamidass, 1989; Meredith, 1987). However, different services require different levels of automation; some are designed to realise efficiency and productivity whilst others aim to deliver quality, speed and effectiveness performance goals. The core activities of highly IIS are automatable although not in terms of machines replacing humans but rather mediating, facilitating or assisting service delivery (Froehle & Roth, 2004). For instance, delivery of data service processes relies on mediated and facilitated technological archetypes to receive and deliver data files from and to clients and in some instances to process data. The case of call centre is complex because simple customer inquiries are fully resolved through the IVR technology system, in the absence of

human interface, affording the customer sales representative ample time to resolve more demanding customer interactions and thus improve efficiency. Actually, it has been suggested that automation enhances service standardization (Bowen et al., 1989; Hickson et al., 1969; Perrow, 1967; Selladurai, 2004). Nevertheless, the kind of automation found in IIS does not support system flexibility that would allow provision of broad scope of services (Chase & Erikson, 1988). Other than the use of routine operational technologies, service processes that are low in information intensity are delivered free of technology.

#### **4.8. Facility Location and Layout**

Evidence shows that for inbound IVR call centre, data and research service processes, the service facility may be located anywhere in the world although the service system should be in the home country of the service provider, near the resources. However, high-contact processes involving interruptive client interaction such as the training process are challenging to globally collocate because of physical customer participation in the process. These findings are consistent with the assertion that highly information intense activities are easier to globally disaggregate and locate anywhere in the world than high contact and high physical material processing service activities (Apte & Mason, 1995). Further, there is evidence that the role of the customer influences the facility layout decision which is consistent with the customer contact model. Facilities that deliver low customer contact service processes are laid out to achieve efficiency and meet customer requirements (Metters & Vargas, 2000). This means that it is customer action and not mere customer presence that explains facility layout decision.

#### **4.9. Hiring and Training**

In regard to hiring and training, employees do not require specific knowledge or academic qualifications to deliver highly IIS processes and that prior experience from equivalent jobs is not considered necessary. For example, the recruitment process for data and call centre processes values individual thoroughness (Lee & See, 2004), ability to quickly learn and follow procedures and potential for longevity in the job more than experience. Since training is generic, it is undertaken on-the-job. In contrast, effective delivery of low IIS processes requires employees with education from relevant fields supplemented by prior experience in similar or equivalent jobs. Whilst it is mandatory that novice employees undertake formal professional development programs, newly hired but experienced employees acclimatize to new projects by learning project specifics in relation to client needs. Job opportunities for these service processes are filled through external sourcing, headhunting or in-house talent development. Due to complexity, some of these processes require a package-like mix of hiring and training characteristics. Whereas employees undertaking IIS tasks are hired without rigid education qualifications or prior experience, managerial positions must meet the require-

ments. In general, the findings suggest that IIS require low skilled employees hired in-house to undergo basic technical training while process low in information intensity require external recruitment of employees with vast experience and interdisciplinary knowledge. This could be interpreted to mean that IIS consumed as information correspond to service factory processes, those consumed through the mind resemble service shop whilst the low IIS processes are akin to expert or professional services (Kellogg & Nie, 1995).

## 5. Discussions

The emerging thesis of this study is that IIS processes are diverse requiring varied service design considerations. Features such as employee skills, employee discretion, automation, facilities and staff hiring and training prove that no one service delivery framework fits all IIS offerings. This study extends extant knowledge since there are no other equivalent studies identifying service design attributes for IIS. Previously, there have been two attempts to classify IIS; one by Niranjan et al. (2007) and the other by Youngdahl and Ramaswamy (2008). The former was based on complexity and criticality dimensions of the service offering and classifies service firms whilst the latter takes an operations outlook and classifies service processes in terms of level of customer contact and knowledge inherent to the process. Although the classifications address IIS, hardly either of them is exhaustive nor captures the whole range of IIS. The present empirically established typology captures the totality of services and better practitioner understanding of the service phenomenon. This paper provides the first theory development attempt in the IIS space. Operations management thinking from an IIS perspective can be fostered by understanding relationships among service products, relevant technologies and corresponding service delivery processes employed. The four cells of two-by-two dimensional traditional classification of services (Schmenner, 1986) are not collectively exhaustive because they consider only extreme cases for each dimension.

A typology containing all important dimensions of the two service beneficiaries; input of the service provider (generic beneficiary) and the nature of action of the direct recipient (specific beneficiary) of the service process and that encompasses all service processes, and captures the levels that lie between the extremes for each dimensions is necessary. Incorporation of customer actions and service provider actions would make such a classification powerful because it would categorise services in a way that encompasses all the traditional dimensions of service classification such as: intangibility, heterogeneity, inseparability and perishability (IHIP) (Sasser et al., 1978); customer contact (Chase, 1978); degree of customer influence (Kellogg & Nie, 1995); degree of labour intensity, interaction and customisation (Maister & Lovelock, 1982; Schmenner, 1986); number of clients processed per process per day and six other dimensions (Silvestro et al., 1992); dimensions of UST and many others. From this study it is clear that, in general, differences in service processes may be explained by i) action of the ser-



vice provider, and ii) consumption act of the customer. Indeed, a clear relationship appears between the various aspects of these two variables. Adopting the configuration approach by Miller and Mintzberg (1984) that ‘... yields a systematic, detailed, and holistic image of reality, without attributing causation to any of the individual parts of the model’ (Ward et al., 1996: p. 602) a service classification is suggested here below. From a service provider perspective and on the basis of inputs transformed, Morris and Johnston (1987) proposed three types of operations; material processing operations (MPO), information processing operations (IPO) and customer processing operations (CPO). Juxtaposing these into the nature of the service recipient’s consumption act; body, mind, possessions, or information gives rise to the service classification in **Table 2**.

Service processes type A entail physical manipulation of materials such as vegetables, wheat and cooking oil in preparing food that is consumed directly by customer’s body. Service processes type B are high in physical manipulations and the customer derived benefits are received through customer’s possessions such as motor vehicles, buildings, and equipment. These according to Hill (1977) are services affecting goods and include maintenance, repair, security, and cleaning services. Type C service processes involve high element of customer involvement and contact with the service provider because customer utility is delivered through physiological transformation such as provision of healthcare services or locational movement such as transporting employees to and from work. Service processes types D and E are informational meaning that most of the service provider’s operational time is spent processing information. Because of their nature, type D service processes are received by the consumer through the mind in form of knowledge, requiring engagement of the thinking brain (Currie et al., 2008; Davenport & Prusak, 1998). Indeed, Drennan (1989) cites legal and education services as examples of informational industries. They include provision of distance learning and research and development services. Type E service processes include data entry and transcription services and are received by customers as ready to use sets of information. Whereas types F and G service processes are consumed in the same way as types D and E respectively, both entail high degree of contact between the customer and the provider. Examples include human resources training for type F and inbound IVR response call centre service for type G. The typology suggests that service classification

**Table 2.** Provider-customer input based service classification.

		How is the service consumed?			
		<i>Customer “self”</i>		<i>Customer “non-self”</i>	
		Body	Mind	Possessions	Information
What is processed?	Material	A		B	
	Informational		D		E
	Customer	C	F		G

should be based on totality of processing actions of the service providers and consumption acts of the customers.

It is clear that service customization is related to the degree of information intensity of customer inputs brought into the service process by the customer. The less informational the inputs into the service process are, the higher the extent of customization and is in line with the suggestion that customization increases as the level of customer contact increases (Chase, 1981; Sampson, 2012a). This means that information intensity and customer contact are equally important though polar opposite explanatory constructs of the service process. Indeed, Apte and Mason (1995) suggest that if higher proportion of total time spent processing tasks is informational, low customer contact time is noted. However, service processes that exhibit mixed aspects of the service provider and consumer action, such as those processed interactively but consumed as information and those processed independently but consumed through the mind, offer new insights. For instance, a service process is standardized to some extent irrespective of the nature of the service provider action (including cases where action is interactive) provided the consumption action is informational. Similarly, service processes consumed through the mind are customized to some extent irrespective of action of the provider (including situations where the action is informational). The findings point towards the proposition that:

**Proposition:** *A service classification that considers actions and or input of the service provider and of the customer is all encompassing and collectively exhaustive.*

This proposition suggests that what makes a service processes distinguishable from another service processes is: processing act of the service provider, that is whether they process information, material or the customer themselves, and, consumption act of the customer, that is whether they consume the service output through body or mind, possessions, or information; or both.

This paper further proposes that service processes that are high in information intensity in actions of the two parties be hereby referred to as ‘pure’ information intense services. Per se, data service processing is pure IIS, research and call centre are IIS whilst training does not meet the criteria and is thus non-IIS.

## 6. Conclusion

The methodological approach adopted in this study has generated a typology for outsourced IIS, helping fill several gaps in OM literature. First, the typology extends service operations management literature on contemporary service classification logics (Sampson et al., 2010) by encompassing services that ordinarily are excluded from classifications. Secondly, the typology provides explicit definitions of necessary conditions for understanding service design decisions. This makes clear the distinction between various types of service processes. Thirdly, the typology attempts to put closure to persistent confusion between the concepts of customer contact and interaction (Schmenner, 1986), but importantly

provides management researchers an avenue for further theory-testing research. A survey study of two or more IIS processes say cash withdrawal from an automatic teller machine (ATM) service process vis-à-vis simple informational inquiry from a customer care desk in a bank could be conducted in an attempt to understand the managerial implications therein. Alternatively, one may compare a transport service process such as air travel from one location to another against the process of seeing a general practice doctor, both of which entail customer processing and are consumed through the customer's body. This may look at the doctor's appointment method vis-à-vis the airline's advance booking method, customer satisfaction, and efficiency of the service processes to find whether there is evidence of convergence, supporting the proposition of this study or discrepancy, opposing the proposition.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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## Appendix 1. Employee Discretion

CASE	Company	Narration
Data	EVEREST	Follow script, fixed objective metrics
	GIGAS	Client formulates SLA, cost and speed are major aims, routinized/automated processes
	HUMONGOUS	Tasks are highly specific
Research	EVEREST	Restricted independence, work defined by client
	GIGAS	Laid down procedures, researcher dependent data collection
	HUMONGOUS	Researcher determines best approach for each project, the research process is sequential but activities require expertise
Call centre	EVEREST	Follow script, economic realities are important
	GIGAS	Adhere to strict procedures, high discretion comes at extra cost which providers are not ready to incur
	HUMONGOUS	Standardized tasks, scripted and routinized, agent monitored
Training	EVEREST	Dependent on the trainer, trainer's diligence ensure success, projects are unique
	GIGAS	Trainers should be flexible, have good judgement
	HUMONGOUS	Person dependent operations, prior experience is key