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**FUTURE DEVELOPMENT POSSIBILITIES OF TALENT MANAGEMENT**  
**UNDER THE INFLUENCE OF ‘INDUSTRY 4.0’**

Master’s Thesis in Management  
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**ABSTRACT**

As the fourth generation of industrial management, 'Industry 4.0' will generate major impact towards the business operation and the stakeholders' cooperation. However, the study of industry 4.0 is currently mainly focused on the technical and production areas but seldom look into the impact towards people. Talent management is a relatively new research phenomenon that focuses on utilizing the top performance and most potential employee within the company. In order to clear the possible integration path of industry 4.0 in MNC and understand the influence of such industrial trend on the management of talents, this study is formed.

This study presents three main research questions that focus on understanding the current status of talent management in typical technology MNC, influence way of this status towards industry 4.0 integration in MNC, and the impacts of industry 4.0 to talent management during/after its integration process.

Ten semi-structured interviews are conducted to gather in-depth inside of research questions by this study. All interviewees are currently working inside the case company and served as operator/talent/line manager.

The findings of this study were analyzed based on the study framework that created on the existing theories. This study found that a clear talent management strategy was missing from the case company, a typical technology driven MNC. The missing of clear talent management vision leads to the low satisfaction rate towards HR department and personal development possibility from both talents and line managers. Quality and quantity of talent within one company, the characteristics of tasks and the rely level of tasks on real-time information will create clear influence towards the industry 4.0 integration process. Key positions and demand of talents are expected to shift towards technology functions, opportunities of personal develop will become the most important factor for better retention performance, and all these changes will require more help from the HR department.

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**KEYWORDS:** Talent Management, Industry 4.0, Internet of Things and Services, Multination Corporations, Technology Integration





## 1. INTRODUCTION

This part of the research will present the background of the current study, identify the research problem and raise the research questions for following chapters, build up the research scope and form the research structure for this overall study.

### 1.1. Research background

Ever since the first spark been lighted up by our ancestors, humans had never stopped seeking for better performance mankind among themselves. In the wild prehistoric world, humans learned from the brutal life loss that they have to find the strongest and fastest man among them to take the responsibility of hunting in order to keep the whole tribe alive. Along with the social division of labor that began with the first industrial revolution, the forming of modern company structure brings a greater demand for those talented people who have the certain skill set and characteristics that provide better performance in some particular positions than their peers.

However, unlike in natural science, these better performance talents do not have one particular set of standards that applies to all companies in all industries, which also under the effect of business and environment changes (Ashton & Morton, 2005). External environment changes always bring fluctuations towards the standards of talents that one company requires, and these changes also make the talents, both currently within and outside the company, generate different demands for the company. Enhanced by the technology development and the common acceptance of digitalization, computers are more relevant to the company activities and. With the massive amount of information that computer collects, analysis and provides on the daily basis, business is changing faster than people ever faced in the history while the demands of talents are correspondingly stepping in a fast changing track.

*'There is a war for talent, and it will intensify.'* exclaim a group of researchers from

McKinsey after their survey regarding the need for talents in 1997. In the survey, Chambers et al. (1998) claimed that human talent will be the new competitive resource that all companies, especially multinational corporations (MNC), should be focused on if they wish to gain and keep their core competence in the new century. (Chambers, E.G., Foulun, M., Handfield-Jones, H., Hankin, S.M. & Michaels, S.G., 1998)

Since the publication, the concept of talent management had been commonly accepted by decision makers and researchers while further triggered the massive attention in related fields. (Ashton, C. & Morton, L. 2005; Gallardo-Gallardo, E., Dries, N. & González-Cruz, T.F, 2013; Collings, D.G. & Mellahi, K., 2009) Despite the attention from both companies and scholars, the lacking understanding of talent management within line managers, the global-local dilemma source from the tradition organizational structure hierarchy, and the fluctuation of talent supply brought by globalization are still creating difficulties for MNC to understand the talents of today and develop their efficiency talent management strategy. (Evans, P., Puick, V., & Björkman, I., 2011; Ariss, A.A., Cascio, W.F. & Paauwe, J., 2014; Ashton, C. & Morton, L. 2005)

Rooted from the human resource management (HRM), talent management has some similar focus areas as HRM, such as managing recruitment, assessment and selection. However, unlike traditional HRM, which targets the normal employees who support company's general function, talent management tend to focus specifically on those people, both internal and external, who are having/might have a high contribution to the 'strategy execution and operational excellence' for one company. (Evans, P, Puick, V., & Björkman, I., 2011; Ashton, C. & Morton, L. 2005) Additionally, talent management usually invests more resource in retention management than traditional HRM. Without the investment, failure of talents retention will not just lead to tremendous loss of previous investment in talent management, but also create massive result as the knowledge and know-how loss plus the high cost of successor recruitment (Evans, P, Puick, V., & Björkman, I., 2011). Compare with the talent management retention failure, unsuccessful retention management of normal employees and their positions can hardly create significant efforts to the

company function. As the reflection of above mention characteristics, managing recruitment, selection and assessment and retention management builds up the current focus areas of talent management study. (Evans, P, Puick, V., & Björkman, I., 2011)

As a prove that the ‘war for talent’ had raised attentions of researchers towards talent management, related publications of recent years (7,421 publications in 2013) had raised 225% to compare with 20 years ago (33 publications in 1995) (Dries, N., 2013; Boudreau, J.W., 2013). Even though there is the rapid rise of publication amount, lacking the common understanding of basic concepts and general accepted theoretical framework within the talent management study continues creating barriers for talent management in managerial practice and new research. (Ashton, C. & Morton, L. 2005; Gallardo-Gallardo, E., Dries, N. & González-Cruz, T.F, 2013; Collings, D.G. & Mellahi, K., 2009) The missing of theory support led to different approaches of interpreting of talent management in practice: some imply talent management as the succession planning in practice, some refer it as the management of talented employees, and most of the HR just simply apply it as a new term for common HR practice (Lewis, R.E. & Heckman, R.J., 2006). Also, the rapid change business and society, such as more diversity in employees, future scarcity of talents, new cooperative methods and so forth, also pushing talent management to develop further and faster. (Ariss, A.A., Cascio, W.F. & Paauwe, J., 2014;)

As the most intensive form of macro environment change, the past three industrial revolutions had proven that each technology trend will inevitably influence how people cooperate with each other in business. These changes in cooperation will bring vast fluctuations towards the standards of talent that one company requires, and also stimulate the talents, both currently within and outside the company, refresh their demands to the company. Among all the current technology trends that are influencing the micro environment and give impact on talent management development, the concept of ‘Industry 4.0’ should be considered as the most significant one. In fact, due to the potential extensive influences of Industry 4.0 to the future macro environment, the theme of *46th Annual Meeting of the World Economic Forum*, the biggest forum for the world leaders and

intellectuals to discuss important and emerging trends in current society, has been set as *'Mastering the Fourth Industrial Revolution'*. (Schwab, K., 2016)

'Industry 4.0', which also known as 'Industrire 4.0' 'Smart Industry' across EU or simply 'The Internet of Things' in the US, is raised by German government at 2012 as one of the high potential "Future Projects" in the total € 8,4 billion budget "High-Tech Strategy 2020 Action Plan". It is referring to the fourth industrial technology revolution that targets to achieve the Internet of Things, Data, Service and people based on the Cyber-Physical System and Smart Factory. (Germany Trade & Invest, 2014; Industrie 4.0 Working Group, 2013; Mario, H., Tobias, P. & Boris, O., 2015; Gobble, M.M., 2014; Saldivar, A.A.F., Li, Y., Chen, W., Zhan, Z., Zhang, J. & Chen, L.Y., 2015) With the estimation by accounting firm PWC in 2015, the investment of related industries of industry 4.0 in EU will reach up to €1,350 billion in next 20 years in order to reach the target set by EU Commission in 2012 that 'boosting manufacturing's share of GDP in Europe to 20% in 2030'. (PWC, 2015; Roland Berger, 2014; Lee, J., Bagheri, B. & Kao, H., 2014) With all the attentions and discussion, as people did towards three previous Industry Revolution, people are fascinated by what industry 4.0 will create. However, with the current amount of publications and research, people also hardly able to clearly understand, the concept itself and not to mention explaining how to achieve it.

Like every other strategy that company applies, talent management strategy can only achieve its purpose and support the overall company performance if it has a good fit with both the company itself and the business environment that company current is presenting or heading. (Ariss, A.A., Cascio, W.F. & Paauwe, J., 2014;) To ensure the organizational talent management are on the right track, a company have to understand how the future talent management will possibly evolve, and base on that evolving trends company will be able to decide where and how should they invest to gain the most advantage compare with their competitors.

Responding this demand, there should be research focus on what is the common talent management status in one type of company; how does talent management affects the

integration process inside the company; and what will be the future talent management development direction under this integration of ‘Industry 4.0’. Such research will provide a better understanding of the future demand from the perspective of both companies and the talents, which will intensively affect the talent management strategy planning. This study is designed to joint ‘Industry 4.0’ trend into talent management development and desire to provide both theory support and managerial suggestions for managers and researchers in talent management during the approaching industry 4.0 age.

## 1.2. Research problems and questions

With the general acceptance of ‘War for talent’ concept, most of the MNCs have implied or started to form their talent management strategy. However, based on the survey of KPMG’s HR Center for Excellence, over 59% of the interviewees think there is currently a brand new war for talent, and this war is different from those in the past. (KPMG, 2014) Such changes in talent management explain why a big portion of talent management strategy are doom to fail: they only apply for the moment when the strategy is set but not evolve with the real-time demands that create by the company development and the new technology trends.

The research problem for this thesis is set as: *‘The lacking of development process identification to new industrial trend ‘Industry 4.0’ and the possible influence of such trend towards both talent management theory and practice in multinational corporations’* This research problem is built on the identification of research gap and several discussion with thesis supervisor and several representatives from the case company Wärtsilä, which is a large manufacturing MNC that focus on marine power and power plant related business. As a MNC, Wärtsilä has great demand for talent management strategy in order to efficiently manage and fully utilize its 18,800 employees in over 70 countries. At the same time, as a large manufacturing company, Wärtsilä desires to improve its productivity and efficiency by implementing digitalization, which can be seen as one minor step for the integration of industry 4.0. Therefore, one of the objective of this research will be solving the research

problem within this large manufacturing company Wärtsilä Oy.

To have an in-depth understanding of the development process of 'Industry 4.0' and its influence on talent management, following research questions were built with several sub-questions:

1. What is the status of talent management in typical technology MNC?
2. How does talent management status influence the 'Industry 4.0' integration within MNC?
3. What are the impacts of industry 4.0 to talent management in MNC?

To answer these questions, a primary framework will be created first based on the literature review of current talent management theories and 'Industry 4.0' research papers. After that, until the completion of interviews and data collection, the primary framework will be developed to assist the further analysis of data and provide answers to above mentioning research questions. As a result, this study is aiming to provide the case company, as well as other companies in similar condition, theoretical support in talent management decision and corresponding managerial implication suggestions.

### 1.3. Research scope

Due to the limitations of time, financial support, accessibility and so forth, the current study is limited to the context of one business section (manufacture sector), one organizational structure (multinational corporation) and one specific business sector (Wärtsilä Service) within case company.

Only three business department (Parts Coordination Management, Distribution and Invoicing, Business Development) from three business functions are selected for analyzing the influence factors of 'Industry 4.0' integration, which will limit the research's credibility. Furthermore, since all three selected departments are from a single business sector of case company, this thesis research will also be constrained by the related conditions that this

specific sector appears.

#### 1.4. Research structure

This thesis paper will be divided into six chapters. The Chapter 1, as mentioned at the beginning of the paper, will provide basic information for readers to understand this research in general. Research background, research problem and questions identification, frame of research scope and research structure will be explained within this chapter.

Chapter 2 provides theory support for the whole research. The part of the study will discuss the most recognized theories, definitions, models, visions and existing gaps of related researches. This chapter will start by identifying the general concepts of talents and talent management, follows by the in depth discussion of what factors will influences the main components of talent management. After talent management, current vision of industry 4.0 and its main components will be presented. Finally, the basic study framework regarding the interaction relationship between talent management and industry 4.0, and between the components within each research target will be presented.

Chapter 3 explains the approaches and methods for solving the research problems and question in this study. It also provides some basic information regarding the data collection and analysis method along with the background information of case company.

Chapter 4 presents the findings of this research. Based on the study framework that this study presented at previous chapter, this part of the study presents the basic findings of the data collected from semi-structured interviews with general employees/talents/line managers within the case company. Attitudes towards current talent management status of case company, towards the industry 4.0 trend as general and towards the possible future impact from industry 4.0 to talent management were all discussed within the chapter. These findings were analyzed and presented with the support of direct quotes from the interviews. At the end of this chapter, one better formed study framework with interaction and



influence factors detail is created.

Chapter 5 will further discuss and analysis the presented findings with the theories and methods mentioned at Chapter 2 and 3. Based on the study framework that created at the end of last chapter, this study compares the finding with the theories presented at previous chapter and expected to identify the positive/negative support towards the theory. Additionally, the possible impacts that industry 4.0 will brings to the development of talent management within MNC context are also discussed.

Chapter 6, as the final chapter of the thesis paper, will summarize the theoretical contributions of this paper to related business studies, and also rise the possible managerial implications based on these contributions. In the meanwhile, limitations of this research and future research possibilities will also be include in this chapter.

## 2. LITERATURE REVIEW

The literature review of this chapter aims to identify the current findings and missing pieces in talent management research, as well as the basic concepts and adaptation of industry 4.0 in academic studies and practical managerial scenario. As this research is aim to identify a possible development direction for talent management in general, the literature that included in this research will be border than similar researches and less specific in each talent management components.

The review will begin with discussing the talent and talent management within the scenario of MNC. After that, major factors that affect three main focus components of talent management will be analysis, follows by the possible influences of these components on industry 4.0 integration process. The Industry 4.0 general concepts and possible implications will then be included afterwards. This review will conclude a framework that presents the current finding and research gaps in both talent management and Industry 4.0 study, which also link these two research targets together from the academic study's perspective.

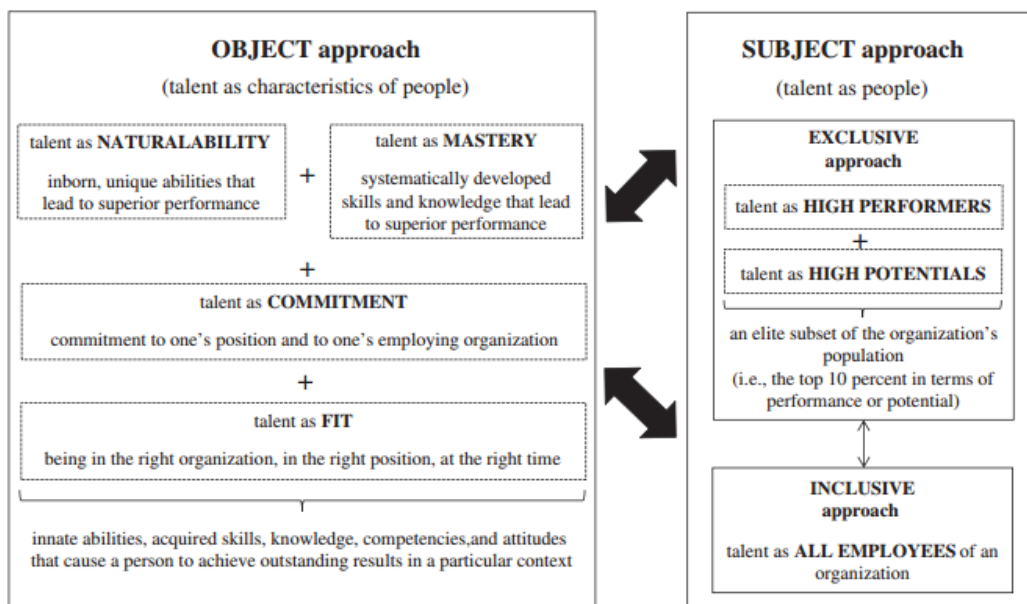
### 2.1. The overview of talent in MNC

This part of the review will provide a general introduction of talents in the context of MNC, identify the importance of managing the talents in such context, and discuss what role should talent management served in MNC's daily function and future development.

Like every other science, it is important to understand the basic concepts of talent before we discuss the theories based on it. After McKinsey pined the idea of 'war for talent' on the research agenda for human resource scholars at 1998, 18 years had passed, and talent management concept had been accepted by most of the scholars and managers. Despite the general acceptance and growing discussion, talent management is still far from a mature science since no current theory can fully provide a precise common understanding of talent

management's elements, cause-to-effect relationship, overall goals and methodological approach. (Gallardo-Gallardo, E., Dries, N. & González-Cruz, T.F, 2013; Collings, D.G. & Mellahi, K., 2009; Ashton, C. & Morton, L., 2005) Therefore, talent management can only be considered, so far, as a phenomenon rather than a solid mature science. (Dries, N., 2013)

To advance talent management into next level, it is necessary to define talent, the research target of talent management, at first. According to the study of Gallardo-Gallardo et al. (2013), talent management scholars are not often specified about the meaning of talent within their work and leave a vague boundary to their research target. (Tansley, C., 2011) By studying the evolving academic research and linguistic history of word 'talent' within working scenario, Gallardo-Gallardo had formed a framework. As Figure 1 below shows, this framework separates all the current definitions of 'talent' into *Objective Approach*, which see 'talent' as special characteristics of people, and *Subject Approach*, which see 'talent' as individuals who possessed special skills and abilities.



**Figure 1.** Framework for the conceptualization of talent within the world of work (Gallardo-Gallardo, E., Dries, N. & González-Cruz, T.F, 2013)

Within the subject approach, there are also two separate opinions: one as *Exclusive*

*Approach* that consider targeting only the elites within one organization, another one, *Inclusive Approach*, consider talent as all employees of an organization.

Although the objective approach specified some potential characteristics that one people should obtain in order to be classified as talent, this research argues that it is not enough to obtain only one or two characteristics (ex. Commitment or Mastery individually) for a better performance than peer since characteristic cannot create efficiency and contribution by itself. One person has to have a correct set of characteristics (ex. Commitment, Mastery, Fit and other characteristic all at the same time) to achieve better performance and contribution to the organization. (reference) Also, the inclusive approach can hardly make sense in modern business since the outcome and rarity of every employee had never been, and will never be equally the same, there are and always will be someone have the higher contribution, which makes such person naturally more important for the organization, than others. (reference) Furthermore, when talent management targeting all employees in the organization, it can hardly be distinguished itself from traditional human resource, and such situation makes inclusive approach a ‘new term for common HR practice’. (Ariss, A.A., Cascio, W.F. & Paauwe, J., 2014)

Based on the arguments above, this study will apply the exclusive approach of talent that best described by Tansley et al.(2007) as: ‘*Individuals who can make a difference to organizational performance, either through their immediate contribution (High Performance, or ‘Hi-Pe’) or in the long-term by demonstrating the highest levels of potential (High Potential, or Hi-Po).*’. This definition of talent focuses on those who have/will have a higher contribution to the organization than others, which naturally brings up the discussion of how to manage these talent people for next section.

#### 2.1.1. Importance of talent management

As the CEO of AlliedSignal and the man who was one step away from becoming the CEO of General Electric, Lawrence A. Bossidy is convinced that, ‘At the end of the day, we bet

on people, not strategies.’ (Chambers, E.G., Foulun, M., Handfield-Jones, H., Hankin, S.M. & Michaels, S.G., 1998) His former colleague Jack Welch, who defeats him in running the CEO of GE (1981-2001) later invented ‘Six Sigma Theory’ and became the 'Manager of the Century' (Fortune, 1999), also believes that 'This whole game of business revolves around one thing: You build the best team, you win.'

At the famous article ‘War for Talent’, Chambers et al. (1998) suggested that from the demand-supply point of view, an overall shortage of talent, raising numbers of new companies in emerging markets, increasing demand for knowledge-based talents and the job mobility are together making MNC harder to attract and retain talented people. (Evans, P., Puick, V., & Björkman, I., 2011; Dries, N., 2013) Such situation makes talent management become the top priority for most of the HR directors in MNC. (Ashton, C. & Morton, L., 2005)

‘Theory of value’ is considered as one of the most crucial tool for companies to analysis and understand their most valuable HRM elements for the organizational effectiveness (Bowman, C. & Ambrosini, V., 2000). Through four talent management value-driven processes, which are value creation, value capture, value leverage and value preservation, theory of value believe that talent management is current shifting from the centers of expertise to the centers of excellence. Along with the shifting focus, talent management activities are aligned with the company overall strategy value and able to contribute better on the company performance.

Rather than focus on the traditional HRM activities and processes, such as designing compensation package, reviewing contracts, talent management is focus on contributing fundamental strategic capabilities that are rather cross-functional than HR process-based. (Sparrow, P., Hird, M. & Cooper, C., 2015) This nature of talent management links it tighter with the company core value performance and enable its role as solution provider for high level strategy problems. For example, by forecasting the future demand/supply in the labour market, understanding the internal/external challenges of company and familiarize

the projects/activities for achieving better productivity, talent management strategy will be able to accumulate the human capitals in improving the company productivity.

### 2.1.2. Talent management in MNC

Rooted from the traditional human resource management theory and gain popular only in recent decades, talent management, as we mention in previous sections, is still a relatively new study which does not have a consistent definition and scope. Among with all the current theories within the talent management study, four main streams can be considered as the fundamental theories of talent management. (Lewis & Heckman, 2006; Collings, D.G. & Mellahi, K., 2009; Wilton, N.,2013; Sparrow, P., Hird, M. & Cooper, C., 2015)

The first stream considers talent manage as some specific areas of human resource management. Researches under this stream often apply the tradition theories of human resource management into talent management study, therefore, can be considered as ‘old wine in new bottle.’(Ariss, A.A., Cascio, W.F. & Paauwe, J., 2014) The second group of researchers considers talent pool development should be the focus, if not the only focus, of talent management. They believe that providing a talent pool that satisfies the demand of manpower and secession need in the company is the key to talent management excellence. This stream distinguished talent management from the traditional human resource management, however, failed to provide overall support for organizational strategy due to the narrow focus on the demand and ignore the importance of keeping the talents within organizations. (Collings, D.G. & Mellahi, K.,2009)

The third stream of talent management started to emphasize the actual term ‘talent’ with Subjective Approach and convinced that Hi-Pe & Hi-Po talents are, and should be only are, the recruitment target of every company. Company overall performance will reach its maximization when all positions within the company are filled with ‘A performers’ (Collings, D.G. & Mellahi, K., 2009; Odiorne, G.S., 1984). Although this stream has wider focus than the second one, it subjectively thinks that filling all positions with talents will

raise the productivity while all other problems that affect the overall talent management performance, such as cost/return evaluation of recruitment, talent selection, retention strategy, and so forth, will have no impact or minor effects on the final talent management outcome. Furthermore, in most scenarios 'Talent' indicates only the TOP performance people or people have the high potential of providing TOP performance, which naturally is an elite group of the company. In such case, when everyone in the organization is being recognized and recruited as 'talent', the paradox of the 'talent' definition will soon arise since the imbalance outcome of positions.

The final emerging stream emphasized the importance of both talents and the key positions, which is the position with the organization that has a bigger influence on the organization performance than other positions. (Evans, P., Puick, V., & Björkman, I., 2011; Dries, N., 2013) Collings et al. (2009) describe this stream of talent management strategy with three main focus: 1) Identifying the key positions that provide higher contribution to competitive and sustainable advantage of organization 2) Developing talent pools, which contains both high performance and high potential talents, so that the key position that been identified can be filled 3) Building different HR structure that focus on fitting talent pool candidates with the key position, and retain their commitment to the organization. As an addition, Huselid et al. (2005) further define the 'key positions' with two main characteristics that 1) have a direct impact on organizational strategy and 2) have wide outcome variation based on the performance of executor. Based on which, Evans et al. (2011) added 3) require unique and/or specific knowledge and experience that is hard to found in the labor market.

Based on the description above, this research argues that position identification, talent pool development, and talent retention are the three most important components of talent management. (Evans, P., Puick, V., & Björkman, I., 2011; Dries, N., 2013) These three components which will be discussed in following sections of this chapter.

## 2.2. Challenges of talent management in MNC

Except for the basic challenges of what study has mentioned in earlier chapter about the

definition of talent, talent management involves with many other evaluations and balancing decisions which greatly challenges the talent management performance of MNC. (Evans, P., Puick, V., & Björkman, I., 2011)

Based on the study of Sparrow et al.(2015), there are five main sets of challenges within the talent management that striving awaiting for managers and scholars to provide suggestion and solutions for better performance:

1. Conversation/discussion quality that links talent management with strategy, organizational design and development.
2. Achieving and enabling the full potential of talent function. (e.g. Identify and ensure the clear links between talent and the sustainable contribution and performance that talents provide)
3. Managing the diversity of talents (e.g. 3Gs: gender, geography and generation)
4. Managing relationships between talent system designer (e.g. top managers and HR department), talent system delivers (e.g. line managers) and talent system users (e.g. talents at different positions)
5. Integration talent management strategy/process with other functions of HR

Except for these main set of strategy-level challenges, talent management also facing several barriers within the daily activities such as the lacking of the talent management mindset, dilemma between global strategy and local practices and different sources for talent pool, which this study will expand further at the following sections.

#### 2.2.1. Talent management mindset

Outstanding talent management practice will not exist without proper talent management mindset, and having such mindset is usually the most difficult part of talent management within MNC. The reason behind the challenge of building up talent management mindset is that it requires high-level attention from three important stakeholders: Top management level which develops the talent strategy; line managers who implement the talent strategy



along with other management practices; and global HR function that supports both development and implementation of the strategy. (Evans, P., Puick, V., & Björkman, I., 2011) If senior/top managers do not invest enough time and resources into the mindset development, line managers take the personal development and retention less seriously, or HR does not participant sufficient in the activities of both parties, it is not hard to predict that talent management cannot provide as considerable value as it supposed to be. (Sparrow, P., Hird, M. & Cooper, C., 2015) See Figure 2. Below

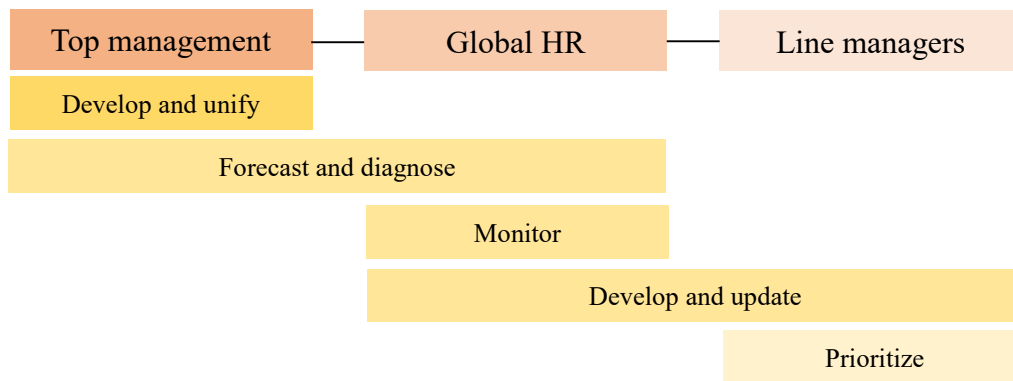


Figure 2. Responsibilities for main stakeholders to conduct global talent management

As strategy developer, primary responsibilities of top managers should be ensuring that the talent management is considered as one of the key components when developing organizational global strategy at its early stage. Also, after the global strategy been maturely developed, top managers have to make sure that it properly reflexes to the talent management strategy as well.

Global human resource function department plays a significant role in talent management as it combines strategy level of talent management with its actual activity practices. It needs to work with top managers in forecasting the external/internal labor market fluctuation and diagnose current talent management performance within the organization. In the meanwhile, it also has to develop and/or update the global standard procedure of talent management activities with line managers. During which, HR have to monitor the general performance of talent management in global scale and provide development suggestions to

both line managers and top strategy makers.

Line managers are at the forefront of talent management, and no strategy will have expected outcome without the support from these executors. To build talent management mindset, line managers have to prioritize related activities (e.g. development discussion) within their daily management process and understand that their management decisions and communication result have a direct impact on the outcome of global talent management strategy.

### 2.2.2. Global-Local dilemma

As MNC operate in multiple countries and areas, global consistency and local adaptation have always been considered as a dilemma in many operation functions. Culture, regulation and law, labor market, (Evans, P., Puick, V., & Björkman, I., 2011) country development level, and other facts variate greatly from area to area. Such variation usually creates frustration and troubles for HR to practice talent management at different levels. Those frustrations of HR will eventually be shown as the inconsistent outcome of talent management (e.g. Retention rate, satisfaction performance) (Woollard, S., 2010) and interferes the industry 4.0 integration process. (e.g. Low retention rate leads to the lacking of coherence in integration process, and extents the project time that caused by the successor training)

By the development of technology, centralized electronic human resource (E-HR) platforms reduced the barrier of providing efficiency HR support in less time and cost. Evans et al. (2001) believe with such development, MNC can benefit from applying a consistent global recruitment, selection and development processes in talent management while business practices in recent decade provide strong evidence for such benefits.

One of most significant benefit from applying global consistency talent management strategy is the consistent quality of talents. With same selection process in different

locations, MNC is capable of reaching out the talents who share similar performance and competitive. By which, MNC will have fewer expatriation difficulties in deploying its talents globally, and the outcome of expatriation will be expectable at a certain level.

Short successor replaces period is another reason for decision makers to adapt global talent standard. Serving by the centralized E-HR database platform, qualified talents can be easily identified, access and evaluated, if a global standard can be met. In such condition, empty key positions can be quickly fill in by qualify professionals in regional, sometimes even global, scenario. Never the less, the combination of global standard and technology will be able to bring more accurate forecast and planning to the talent management. Since the process and evaluation standards are globally common, MNCs will be able to predict the fluctuation of workforce and plan accordingly in advance by big data and algorithm technology, this study will further discuss these technologies in the following sections of industry 4.0.

Instead of extent global consistency in every position, Evans et al. (2001) also argue that general contract staffs that focus on operation and routine tasks should imply the local adaptation to gain local differential advantages at the place MNC operates.

### 2.2.3. Internal Development vs. External Recruitment

When considering filling key positions inside the company, there are usually two main methods: External Recruitment versus Internal Development. For the organization that prefers developing the talents internally by themselves for key positions, they need first to identify their internal labor markets (ILMs).

ILMs can be seen as the long-term integration process between the company strategy and its employee's' personal development. Through the mutual attachment development, employees have a clear understanding of organization culture and value with not only the knowledge and know-how one company needed but also a high commitment to their

position. (Myer, J.P. & Allen, N.J., 1997; P., Puick, V., & Björkman, I., 2011) By these advantages, talents tend to take less time in familiarize new responsibilities and provide consistent performance when being appointed to key positions. Organizations, in the meanwhile, has a better understanding of the skill set and personal characteristics of each candidate thus will be able to make a better judgment when selecting talents to key positions.

However, the downside of ILM can do larger harm to the organization if talent management was not practiced effectively in the correct direction. As the nature of any long-term process, the investment, such as capitals, human resources, opportunities and so forth, of ILM projects will be much higher than normal development courses or external recruitment process. Sometimes, these investments cannot guarantee their equivalent return due to wrong training selection (e.g. Courses provided based on the company's vision and ignored employee's need), inflexible plans (e.g. Lacking newest trend training, fixed training schedule), inconsistency retention management (e.g. Talents being stolen by competitors after expensive training period) and also lacking external information (e.g. Less external recruitment brings fewer employees who have essential information regarding competitors). (Evans, P., Puick, V., & Björkman, I., 2011)

For organizations to choose between the internal development and external recruitment, or as Evans et al. refer as '*external buy*', Cappeli, P. (2008) developed an evaluation practice that based on four basic questions. See Figure 3 below.

By forming the evaluation questions, Cappeli suggested the companies to develop their talents through ILMs when the need of talents is long, skill/experience requirement within the industry naturally builds up a well-form career hierarchy, company culture builds up a significant part of their competitive advantage, and the future demand for talent can be accurately foresee.

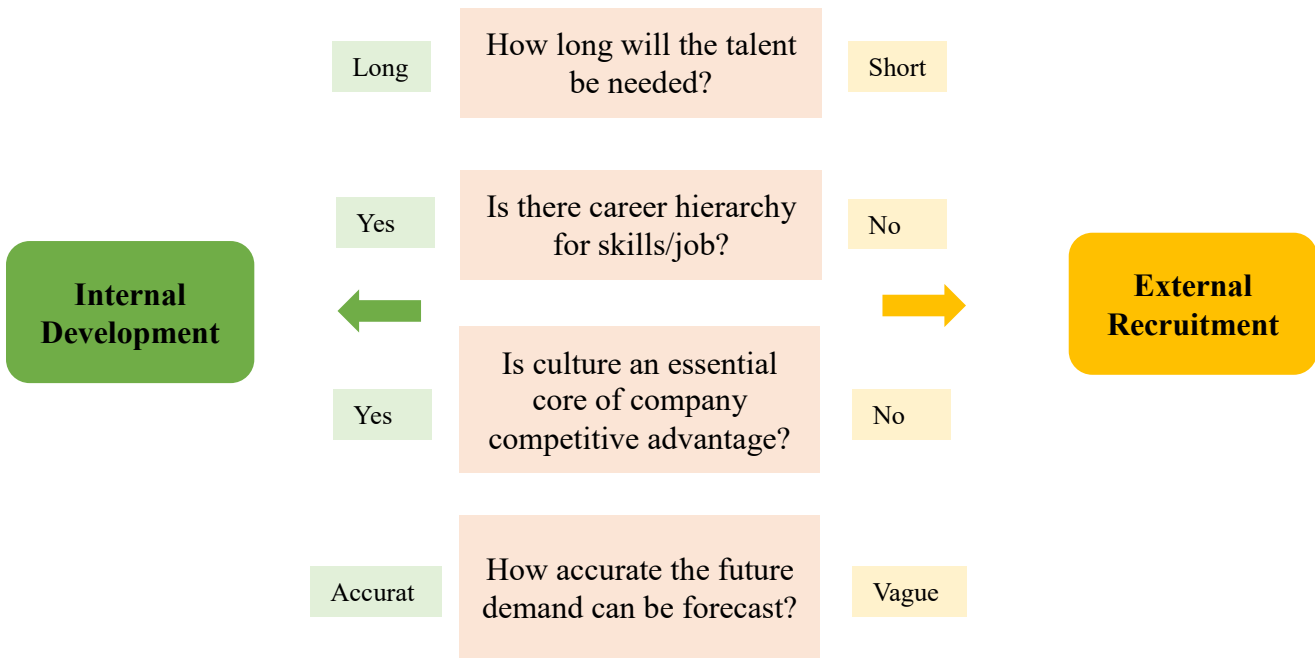


Figure 3. Talent recruitment vs. development evaluation. (Cappeli, 2008)

### 2.3. Factors influencing key positions identification

Being a newly developed research field, talent management should be considered as an immature science. Key position identification can be a suitable example for people to understand the suffering of lacking consistent paradigm in talent management. (Chalmers, A.F., 1999)

As one the major component of talent management, key position identification had been repeated mentioned within related studies. Historically, these key positions were usually being identified as the managerial and leadership positions, but along with the development of complicity technology and systems, technical positions that able to create great influence on the competitive advantage of the company are getting more attentions as well. (Evans, P., Puick, V., & Björkman, I., 2011)

Due to the missing of consistent understanding regarding what key position is, the study

finds that not just the managers but also the scholars have some misunderstanding of key position's characteristics. One of the most common mistakes, this study believes, is linking the importance of position with the scarcity of the positions within a company and argues that the rarer one position within one company, the more valuable it is due to the lack of replacement. This opinion mistakenly connects the quantity of position with its quality (influence quality). Take personal assistance as an example: there might be only one personal assistance for CEO, but that does not make that position a key position since its performance does not have strategy influence to the company performance. Key account manager, on the other hand, might not be the least seen position in a company, but their performance can easily influence the attitude of big customers, therefore, should be considered as key positions that have the ability to influence the company strategy performance.

*High value-adding.* At 2005, Huselid and Becker proposed that within every organization, there are always be some roles creates more value and have a higher impact on the organizational strategy than others, and, naturally, organizations should invest more in the people who are currently in these positions (Hi-Pe) and/or have the potential to provide positive outcome when they are appointed to these positions (Hi-Po).

*Scarce experience and/or skills needed.* Simultaneously, many positions inside the organization are providing essential support to high value-adding positions. However, these supporting positions could not be considered as key positions due to the necessary experience and skills for people to provide expected performance on this position are relatively low and easy to obtain. (Swales, S & Blackburn, M., 2015; Whelan, E. & Carcary, M., 2011) For the organization, it means that they will be able to find the replacement for these positions in relatively short time, and the outcome of such replacement would not be easily affected by the replacing people.

*High risk in failure.* (Sparrow, P., Hird, M. & Cooper, C., 2015) As a result of the massive impact on organization's strategy and the difficulties to obtain both enough experience and

relevant skills for key positions, the risk of key position performance failing will be greater than other positions, so as the damage such failure will do to the organization.

Based on the three characteristics above, this study suggests that key position is *the position with both high failure risk and high value-adding function that demands scarce experience and skills, which will possibly create both great positive and negative impact towards the overall organization performance.*

#### 2.4. Factors influencing talent pool development

Under the exclusive approach, which defines talent as ‘Hi-Pe’ and Hi-Po’, organizations will have to ensure their accessibility to these people in order to maintain their ability to fill key positions with talents. As the tool to ensure such ability, talent tool concept was raised (Gallardo-Gallardo, E., Dries, N. & González-Cruz, T.F, 2013)

Differential of characteristics, organization size, structure, business sector, market strategies, and other essential factors creates unique demand of talents and development plan of for talent pool development. (Swales, S. & Blackburn, M., 2015) The diversity of employees, for example, creates better performance in private business sectors where exist high competition and intensive profit orientation business activities. Public sector and Nonprofit Organizations (NPOs), on the other hand, have less intensive daily actions due to their non-profit nature, therefore, prefer to be collectivism and keep their workforce similar. (Rainey and Chun, 2007)

Except for the demand, supply is another theme organization needs to consider when drafting their talent pool development strategy. ILMs performance, which the study had discussed in the previous sections, determines how well one organization can ‘create’ talents for themselves based on the internal human resource (Myer, J.P. & Allen, N.J. 1997). External labor market environment decides the overall supply to the organization talent pool. (Kim, S. & Mclean G.N., 2012) Take German as an example, aging population, which

is one of the biggest problems of in next decade for all the developed economies, is considered to be the major crisis in the future of Germany labor market. By the estimating of the related organization, 21% of the Germany population will reach over 65 years old in 2014, bringing a possible up to 5 million workers lost over the next 15 years and further worsen this imbalance population structure. (The Guardian, 2011) This supply shortage in the external labor market will irreversibly result in the shortage of talents supply in every business sector and, therefore, affects the talent pool development of organizations.

## 2.5. Factors influencing retention performance

Although presented as the last section of talent management, retention performance management should be considered as the most vital element of the talent management. This opinion is made based on one basic human resource theory that if one talent individual obtains scarce experience and skills that are also valuable for other organizations, this individual will highly possible be targeted, attracted and steal by other organizations in the market with better opportunities offer. This theory further proves that any investment towards talent management will be wasted before turning into value unless the company is capable of retaining these talents within the organization and motivates them to deliver consistent value to the organization through their daily work. (Evans, P., Puick, V., & Björkman, I., 2011)

Scholars with different industrial background had conducted a significant amount of the research on employee turnover and retention, each of them has various conclusions regarding how should organization performance practice better in talent retention management. This study reviews a few of the most referred researches and builds up a framework for most common factors that affects retention management.

*Personal development.* One main component of the personal development is internal development and promotion opportunities that provided by the organization. The latest report from Association of Talent Development (2016), which formally known as



American Society of Training & Development (ASTD), states that 88% of organizations do not prioritize internal hiring, only 24% of organizations have well-defined program for the high positions opportunities, and 12% of organizations do not even have internal hiring program. All these short attentions to internal development and promotion opportunity have directly resulted in their poor retention performance. (Evans, P., Puick, V., & Björkman, I., 2011; Welch, D. & Welch, C., 2015) Another main focus of personal development is the exciting and challenging responsibility. This factor organization has no control with due to the inspiration is highly linked with personal interest which organization can hardly identify, and opinions regarding challenging responsibility variate greatly from people to people. What organization can do is to improve their recruitment process to identify personal interests and experiments of talents more accurately. (Bhatnagar, J., 2007)

*Compensation.* Although higher income is one of the most common reason for talents to switch organization, research shown that it is not the higher compensation but the lacking of job satisfaction triggers talent to search/consider opportunities outside the company. Therefore, higher salary package for talents could resist the talent turnover in a short time, but it will eventually damage the competitiveness of the organization due to the low cost efficiency. (Evans, P., Puick, V., & Björkman, I., 2011)

*Relationship quality with the direct boss.* As one well circulate epigram say 'People leave managers, not companies,' line managers are usually those who have the most impact on talents motivation and retention performance. The loyalty of talents can come from both formally and informally positive daily interaction with their direct managers. Those interactions can build small yet consistent positive and supportive image and eventually will strength the sense of belonging to employees. (Branca, JR.R., 2015)

*Work-life balance (WLB).* Rarely being observed at high social benefits areas such as Nordic, WLB has always been one of the biggest issues for low job satisfaction rate in MNC located in emerging markets such as South Asia and South America, some countries

(e.g. Japan and South Korea) also have intensive conflicts that rooted in the culture. Such differences within different organizations often create a unique company culture and, for some talents, hard to remain the passion for working within. (Evans, P., Puick, V., & Björkman, I., 2011; Deery, M. & Jago, L., 2015) As an example of WLB imbalance among the world, The Guardian (2015) reports that 22% of the Japanese and 35% of South Korean work more than 49hrs per week, while this number is 11 % in France/Germany and 16% in the US. There is no doubt that most of the talents from Nordic will have the feeling of being badly treated if they are working in Japanese organization under the same terms as other Japanese colleagues who are fully accepted this culture.

The discussion above had provided a general vision of talent and talent management, the characteristics and influence factors of both concepts had also been analyzed. This study concludes that by better identifying key positions of a company, developing talent pool efficiency and improving the retention performance, a company will be benefit in having higher working efficiency, satisfaction and higher retention rate of their talents. Eventually such benefits will turn into the development of the company overall productivity and profitability, which creates a stable environment for integrating new changes like industry 4.0.

## 2.6. The overview of Industry 4.0

German government identifies '*Industry 4.0*' as the fourth industrial revolution that usher in the *Internet of Things and Service* from other areas into the manufacturing environment as the initiator of concept. (Industrie 4.0 Working Group, 2013; Weyer, S., Schmitt, M., Ohmer, M. & Gorecky, D., 2015; Albert, M., 2015; Gobble, M.M., 2014) See Figure 4

below.

WORLD  
ECONOMIC  
FORUM  
  
COMMITTED TO  
IMPROVING THE STATE  
OF THE WORLD

## Navigating the next industrial revolution





Revolution	Year	Information
	1 1784	Steam, water, mechanical production equipment
	2 1870	Division of labour, electricity, mass production
	3 1969	Electronics, IT, automated production
	4 ?	Cyber-physical systems

Figure 4. History of industrial revolutions (Schwab, K., 2016)

Being consider as the successor of previous three industrial revolutions, industry 4.0 is expected to create not only new value chain and business models across product life cycle (Mario, H., Tobias, P. & Boris, O., 2015) but also a ‘Smart, networked world’ (Industrie 4.0 Working Group, 2013). Along with its creation, industry 4.0 also indicated a paradigm shift to ‘decentralization’ vision from the ‘centralization’ vision, which had been well-established after the first industrial revolution, within the manufacturing industry. (Saldivar, A.A.F, et al., 2015)

Except for the value chain and paradigm creation, industry 4.0 also expected to have a ‘exponential evolving’ rather than linear paces as previous three industrial revolutions. Moreover, this exponential change can be foreseen to create changes both wide in breadth and deep in depth for the systems of productions, management, governance and so forth in ‘every industry in every country’. (Schwab, K., 2016)

As a popular emerging industrial trend, industry 4.0 is under intensive debate between consultants and researchers regarding its components and future visions. The original developers of industry 4.0, Forschungsunion and German National Academy of Science and Engineering (Industrie 4.0 Working Group, 2013) believe industry 4.0 should focus on ‘creating smart products, procedures, and processes’, which serves the final vision of ‘Smart, networked world’ that based on the Internet of Things and Services. In their vision, *Smart Factory* that supported by the *Cyber Physical Systems (CPSs)* will be the key concept that vertical networked with overall business processes. It provides real-time data to *Smart Products*, which are horizontally connected to other value nets, and served as the interface of other smart functions (e.g. Smart Logistic, Smart Grids) (Weyer, S., Schmitt, M., Ohmer, M. & Gorecky, D., 2015) See Figure 5 below.

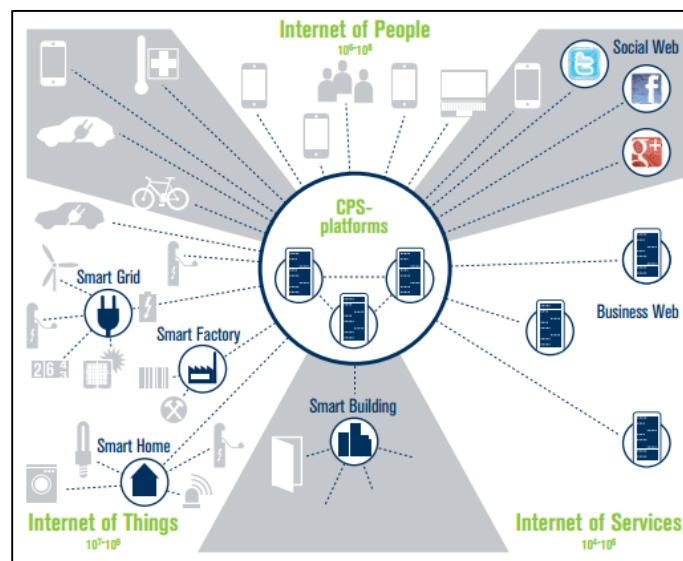


Figure 5. The Internet of Things and Services – Networking people, objects and systems (Industrie 4.0 Working Group, 2013)

This stream had been generally accepted by most of the researchers. However, some consulting firms and researchers have some minor disagreements with the role of Smart Products and the final vision. They believe that instead serving as the interface, smart product should be considered as the components of all the smart function/infrastructure (e.g. smart buildings, smart grid) (Deloitte, 2014; Roland Berger, 2014). Smart factory,

they claim, is the only foundation of Industry 4.0, which links business and social network altogether and assembled the final image of 'Internet of things, service, data and people.' (PWC, 2015; Mario, H., Tobias, P. & Boris, O., 2015) See Figure 6 below.

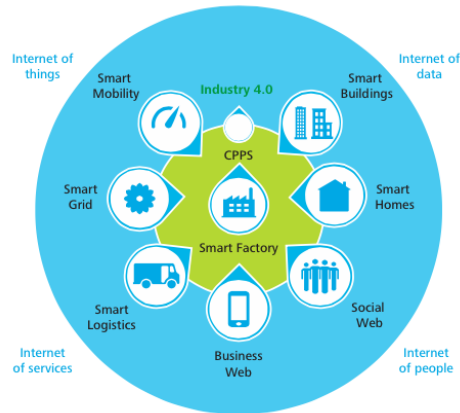


Figure 6. The Industry 4.0 Environment. (Deloitte, 2014)

This view of industry 4.0 neglect the fact that all smart functions are intangible and invisible to people without smart product serving as the interface (e.g. impossible to acknowledge the function of smart logistic without proper equipment), and smart infrastructures can only provide its function with the functional smart products. (e.g. Sensors) Additionally, data is the source of all smart functions while people is the beneficiaries, both of them should not be considered as the product of industry 4.0.

Except the mainstream, there are also other firms have very different approaches. Capgemini firm believes that the intangible changes in Smarts Innovation and Smart Supply Chains, are just as important as Smart Factory while Smart Products is only an subject under overall Smart Solutions. (Capgemini, 2014) See Figure 7 below. This study argues that this view parallels the outcome through the implementation of Smart Factory (e.g. Smart Supply Chains) with fundamental role of Smart Factory itself, which will possibly mislead the future studies losing focus of the real critical component.

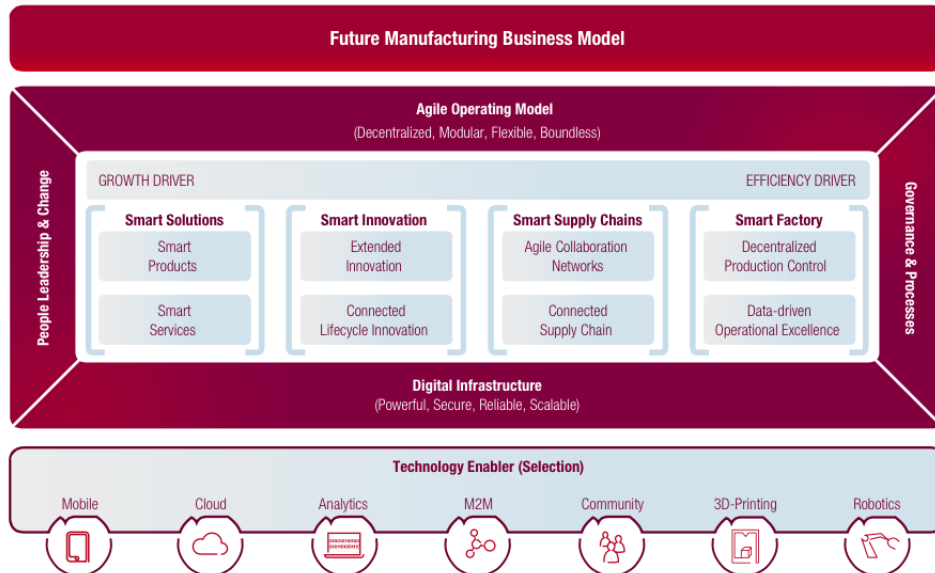


Figure 7. The Capgemini Consulting Industry 4.0 Framework. (Capgemini, 2014)

Concluding the main streams of *Industry 4.0*, this research believes the best conceptual approach should be the stream that raised by the original developers, who see ‘*CPS*’ as the elemental system for developing ‘*Smart Factory*’ and the foundation of all further functions. ‘*Smart Products*’ serve as the interface that tackles all further functions, in both vertical value chain (e.g. business network for a particular organization) and horizontal networks (e.g. all stakeholders' business networks that shares data), and eventually builds up ‘*the Internet of Things and Service*’. The next sections of research will expand above mention concepts a bit more to create a better understanding.

### 2.6.1. Cyber-Physical System (CPS)

As a concept itself, Cyber-Physical System (CPS) is considered to be the concern-stone of industry 4.0 development. (Industrie 4.0 Working Group, 2013) It enables and manage the operational connections of the physical assets and its surrounding environment with the computing and communication capabilities (Jazdi, N., 2014; Lee, J., Bagheri, B. & Kao, H., 2014), by which it makes the fusion between the physical and virtual world possible. (Kagermann, 2014) Through this new connection, CPS vertically connects physical

manufacturing facilities with business decision process and horizontally connects other diverse value networks. (Industrie 4.0 Working Group, 2013)

Rainer Drath et al. (2014) provided an interesting and well-argued vision of CPS in his paper for IEEE industrial electronics magazine 2014. In his paper, Rainer divided a well-developed CPS into three levels: the bottom is ‘Physical Objects’, which gathers the data and information, to ‘Network Infrastructure’ that process the data (e.g. cloud computing and big data technology) and finally, on the top level is the ‘Services’ that provided by algorithms based on the previously collected data. See Figure 8 below. As an extent to Rainer’s vision, CPS can be commonly defined as an automated system that connects and controls physical process via a feedback loop in the network with embedded computers monitors for computing and communication. (Albert, M., 2015; Jazdi, N., 2014)

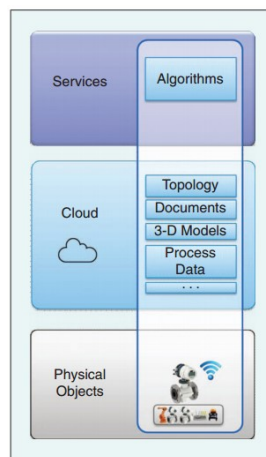


Figure 8. Three levels form a CPS in Industrie 4.0 (Drath, R. & Horch, A., 2014)

As an opposite of Rainer et al.'s result, Jay Lee et al. (2015) developed a new architecture with five different levels. See Figure 9 below. In Lee et al.'s opinion, CPS implementation should be started with 'Smart Connection Level', which gathering the raw data via sensors, and finally achieves the 'Configuration Level that acts as resilience control system (RCS) and provides predicted supportive decisions for managers.

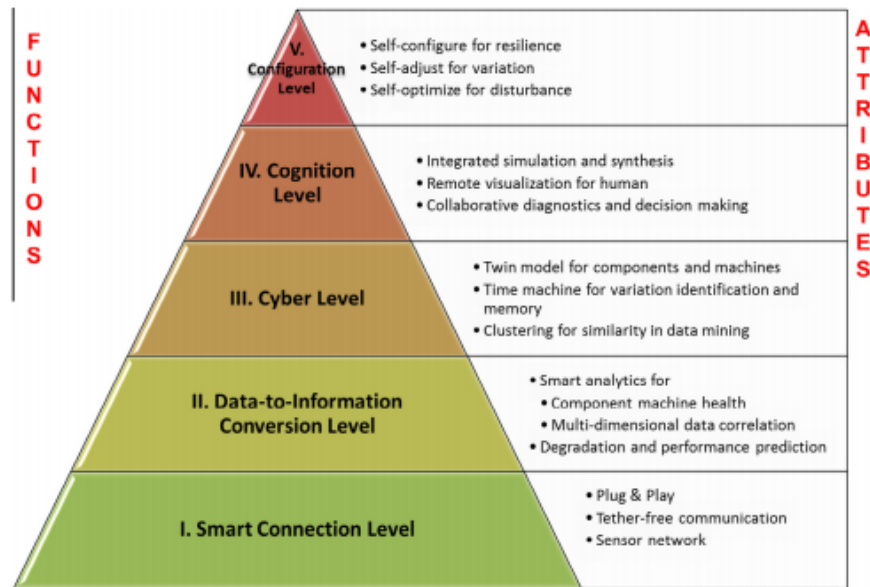


Figure 9. 5C architecture for implementation of Cyber-Physical System. (Lee, J., Bagheri, B. & Kao, H., 2014)

Serving as the information tube between physic and data, CPS cannot function individually within each level of a system. Without the support of proper data processing and analyzing the process, (e.g. counting the application numbers for a certain position without further analyzing their resume), physical objectives can only provide a function that is nothing more than action execution and raw information collection, which does not create any further/extra adding value to productivity. The Same logic applies to the 'Network Infrastructure', without proper algorithms to provide well-analyzed action suggestions that based on the real-time data, if not possibly more, sending proper action orders directly to machines to follow, processed data cannot be value for the overall organizational performance. (e.g. Knowing the best candidate for one position but never make further



contact)

### 2.6.2. Smart Factory

Factories of MNCs are the base of manufacturing production process. Therefore, the CPS implementation in factories should be considered as the 'key feature of Industrie 4.0.' (Kagermann, 2013). In the original vision of smart factory that research group proposed, both physical (e.g. Human, machines, raw materials) and intangible (e.g. information, data) resources will be able to freely communication and corporate with each other as in nowadays social network. (Jazdi, N., 2014) By this integration, Bernd Heuchemer, the vice president of motion control at Siemens, believes that a new working environment for productivity integration between workers and machine will be created. (Albert, M., 2015) Furthermore, this combination of networks will also be capable of providing lower errors and higher safety rate for the production process. (Mittermair, M., 2015; Industrie 4.0 Working Group, 2013)

Another view of smart factory believes that smart factory is rather a developed factory that supported by CPS than a network. By the 'Calm-system', which can sense, communicate and interact with its environment, smart factory seeks to assist people and machines in their task execution. (Mario, H., Tobias, P. & Boris, O., 2015)

This vision, the study argues, failed to recognize the factory, which is originally understood as 'A building or group of buildings where goods are manufactured or assembled chiefly by machine' (Oxford Dictionary), is not capable of achieving the theoretical outcome with the CPS system that only applies to buildings. If the core of manufacturing and assembling, which are people and machines, are not included in the information flow, production efficiency will still be limited by the communication inefficiency between each other, and the improvement of productivity will remain at an extremely low level. As a matter of fact, this vision of smart factory should be considered as the extension of 'Smart Product', which we will have further discussion in next section.

As the new production and corporation structure upon CPS, a smart factory has several different characteristics that differentiate itself from its ancestors. See Figure 10 below. By the support of CPS, a smart factory will be able to further develop some existing functions and achieve a better result in multiple actions. The intelligent production utilizes manufacturing process and achieves less time, higher quality with less cost. Smart products provide the mobile interface for all stakeholders to have real-time monitoring the manufacturing operations and the information in the whole supply chain. The role of human in smart factories will face dramatically change, when fewer errors and waste (both material and energy) creates by automation, the organization can also have the opportunity to relocate their human resource to more value-added positions and projects for better profits.

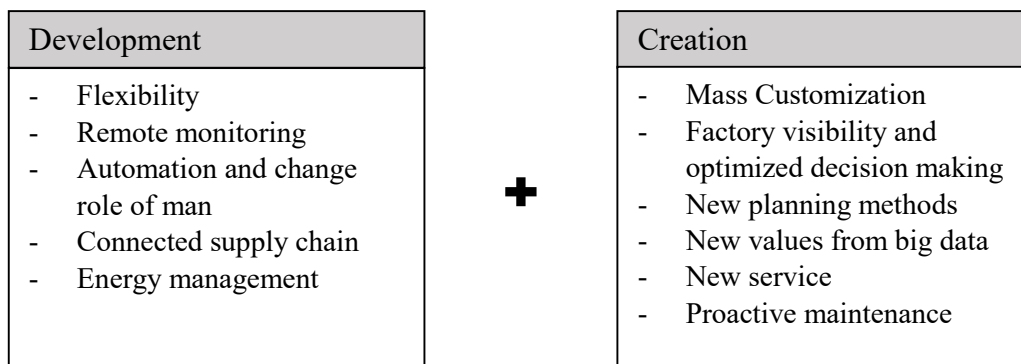


Figure 10. Characteristics of Smart Factory (Shrouf, F., Ordieres, J., & Miragliotta, G., 2014)

Except developing the existing functions, the smart factory will also gain some innovative functions that first three industrial revolutions cannot meet. Massive customization, which includes low production volumes, special design and last minute changes, become possible for organizations to provide better customer experience while remaining profitable. IoTS provides process management visualization and therefore enable the possibility to optimize planning, maintenance, and decision making.

### 2.6.3. Smart Products

More than serving as the commodity that provides smart functions to the customer, Smart Products is also able to show its intelligence before it enters the market. Within the factory, people can hardly identify traditional products from each other due to the consistent standard of massive production. However, each piece of smart products has their own unique identification code that let both stakeholders and other smart equipment to identify it, know its history, current status and location, and the future direction of the production and logistic chain in any time, any place. (Industrie 4.0 Working Group, 2013; Schuh, G., Gartzen, T., Rodenhauser, T. & Marks, A., 2015) In another word, the smart products will have the self-awareness with data collection/sharing function for better information sharing among stakeholders, higher efficiency for production, faster and accurate delivery for logistic, and so forth.

When serving as a product to fulfill the customer demand, smart product will be able to sense its current status, (Industrie 4.0 Working Group, 2013) and future possible performance while selecting the best possible option from multiple possibilities in order to achieve customer's best efficiency. What is more, all above mentioned functions can be completed by the smart product itself, if being programmed and authorized by the customer, without altering and disturbing its owner.

Smart product, as mentioned in the previous section, also served as the main data source for analyzing algorithms. (Shrouf, F., Ordieres, J., & Miragliotta, G., 2014) By studying the data from both the smart products within the factory and those under use of customer, algorithms will be able to develop suggestions to decision makers. By those data-based suggestions, decision makers will be able to better utilize production resources, further develop existing products and services based on the needs of customers, creating new services and products based on the study of customer's business pattern.

#### 2.6.4. Internet of Things and Service

Internet of Things and Service (IoTS), according to Bryce Barnes, the senior manager from Cisco Machine and Robot department, is the ‘intelligent connectivity of smart devices.’ (Albert, M., 2015; Pérez, F., Irisarri, E., Orive, D., Marga, M., & Estevez, E., 2015) Except for the ‘intelligent’ and ‘connectivity’, Radziwona et al. (2014) also emphasize that the ‘independent’, which can be considered as acting without direct human participation, should be included as an important ability of IoTS.

When the data can be collect and share in real-time through in-process objects, production equipment, and other smart objects, decentralization intelligence will raise and replace the current centralized manufacturing/control system. (Shrouf, F., Ordieres, J., & Miragliotta, G., 2014) Alternatively, in another simpler word, as International Telecommunication Union (ITU) describes IoTS, ‘anyone, anytime, connection of anything from anywhere’ (Atzori, L., Iera, A. & Morabito, G., 2010)

IoTS had generally been seen as the final goal of industry 4.0. (Industrie 4.0 Working Group, 2013) By analyzing the collected data from smart products, smart factories will be able to better define customer’s decision pattern and demand. By such information, decision makers and/or preprogrammed algorism will be able to provide customer more suitable service and smart products that continues sending real-time feedback to the smart factories and create well-established information loop. (Shrouf, F., Ordieres, J., & Miragliotta, G., 2014)

The main differences between IoTS and normal digitalization approaches that company used to implement and/or currently implementing is the accessibility of the information. (Schwab, K., 2016) Within the current value chain of company, individual management/information system of different stakeholders creates most of the barriers between organizations cooperation. Compare with hundreds years ago when people have to wait for months and years to get the product information from their suppliers who located

at other countries, people in nowadays in expecting to obtain such information within hours, even minutes. The desire of efficiency urges people to look for even faster way to break down the barriers and obtain information regarding business, which is one major benefit, as we mentioned in previous sections, of industry 4.0. This improvement of information accessibility is expected to granted companies exponential evolvement and further triggers the possibility of new service/product/business models.

#### 2.6.5. The vision of industry 4.0

As we briefly stated in the previous sections, industry 4.0 is and will continue to create new products, services, standards, procedures and processes that have high potential for all the organizations to benefit from. (Industrie 4.0 Working Group, 2013) Figure 11. below shows the characteristics of the vision of Industry 4.0.

*Social technology interaction.* Previous sections of the study had mentioned multiple times regarding how CPS will be able to connect the horizontal and vertical networks. This connection brings social technology niteration into a new level that all the manufacturing resources will be utilized and capable to self-react in different situations for higher efficiency, sustainability, and profit. (Industrie 4.0 Working Group, 2013)

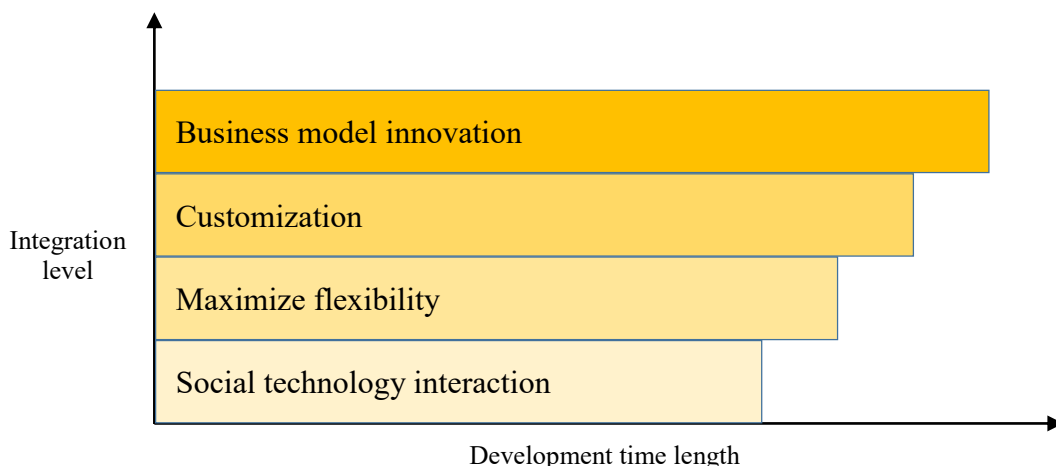


Figure 11. Vision of industry 4.0

*Maximize flexibility.* In nowadays business, any changes in the design (e.g. the length of water resistance tube for engine), plans (e.g. delivery time and location), and maintenance (e.g. emergency breakdown of engine part that requires replacement) will cause massive amount of emergency rescheduling, which further creates unnecessary time, human power and financial loss. (Industrie 4.0 Working Group, 2013) With the help of big data and CPS, industry 4.0 enables high flexibility for scheduling and automation. (Jazdi, N., 2014) For example, abnormal data from an engine will be collected by embedded sensor and send to cloud server, from where algorithm can detect and analysis the necessity of engine part replacement. Once the decision of replacement been made (by either human or preprogrammed algorithm), an order of related replacement parts will be sent out and the logistic plan of delivery will be draft. Through this process, customer would receive a new replacement engine part even before they know some unexpected breakdown will happen.

*Customization.* With the highly automatized smart factories, various details of products can be specifically design and manufacture to meet the customer's requirement. (Jazdi, N., 2014; Industrie 4.0 Working Group, 2013) Fitting small amount of exceptional products into a massive standardized production line will be possible and profitable.

*Business model innovation.* Apparently the higher level of data interaction, automation, flexibility and other areas that industry 4.0 influence will require new business process to unleash their productivity and profitability. In the meanwhile, new working responsibilities and methods, which shift from relatively routine tasks to higher added-value creative tasks, will require employees to command new skills to gain better performance. (Industrie 4.0 Working Group, 2013; Jazdi, N., 2014) All these changes with the business process and employees will accelerate the development of existing business model and also triggers new service and products for both SMEs and MNCs (Saldivar, A.A.F, et al., 2015)

#### 2.6.6. Opportunities and challenges to MNCs

Higher quality and more efficiency decision-making process. With the 'intelligent connectivity' between the smart devices, information and data will be automatically

collected by sensors and process by analytical software, which provides not only the real-time information for decision makers to refer but also the results of possible decisions. (Albert, M., 2015) By knowing the most updated information and influences of the decisions, managers will be able to make better decision in less time for achieving better organization performance. (Jazdi, N., 2014)

All MNC, no matter large original equipment manufacturer (OEM) or major suppliers, and the small local enterprises will benefit from the emerging technology and fast speed communication platform. (Albert, M., 2015) SMEs will be able to use the services, hardware, and software that they are not able to afford via the ‘network manufacturing’, which bigger organizations lend the free time of their machine/hardware to SMEs and further utilizes their investment in equipment and infrastructure. (Industrie 4.0 Working Group, 2013)

Tighter corporations with business partners. With the new business and partnership model, organizations will be able to share time-sensitive information (e.g. offers to certain product) among their value chain in much less time. By such sharing activity, all interest parties within the same value network will have to possibility of collectively sharing potential business benefits and create new ones that were hidden due to the information barriers. (Industrie 4.0 Working Group, 2013)

Set aside the benefits, Industry 4.0, as previous three Industrial Revolution, brings up new challenges towards every organization when integrating the new technology into their daily business.

Cybersecurity issues will be even more important. At most of the MNC, cybersecurity lecture has been set as one of the compulsory studies for all newcomers, but with the implementation of Industry 4.0, they will face even more threats in related fields. (Albert, M., 2015; Schwab, K., 2016) With the development of digitalization, more sensitive information and trade secrets will be upload and storage inside company servers when

hackers have more accessibility than traditional physical copies, and the threats of such information being stolen will increase along with the implementation process. (Drath, R. & Horch, A., 2014; Jennings, A., 2014)

New legal problems will be potential threats. The new business model will create potential legal liabilities that current law did not cover. Intellectual property, know-how, decision liability, risk of finance, and so forth will be the areas that sensitive to the corporation model change and, therefore, should be discussed and planned by legal service provider along with the development. (Industrie 4.0 Working Group, 2013)

One possible example regarding how industry 4.0 will be able to affect talent management is that it will be able to provide better forecast result for top managers and HR department to develop talent management strategy accordingly. Forecasting, as in every other business, is the hardest responsibility for talent management to fullfill due to the massive amount of uncertainty, complex interaction relationship between influence factors, lacking of the realtime amending ability and so forth. With the data accessibility through industry 4.0, decision maker will be able to have real-time update regarding influence factors of talent demand, such as visualized market demand changing patterns. Through these information, uncertainty of talent development plan can be greatly reduced and amend according to the real demand rather than the speculation of old data.



### 2.6.7. Framework of the study

The literature review above reviewed the existing findings and challenges in the study of talent management and industry 4.0, especially the factors will create impacts to the talent management development. By the review, we will be able to divide the influence factors to talent management development into three groups, which are key positions identification, talent pool development, and retention performance. See Figure 12. This figure presented the basic framework of this study based on the literature review and informal hypothesis of future development.

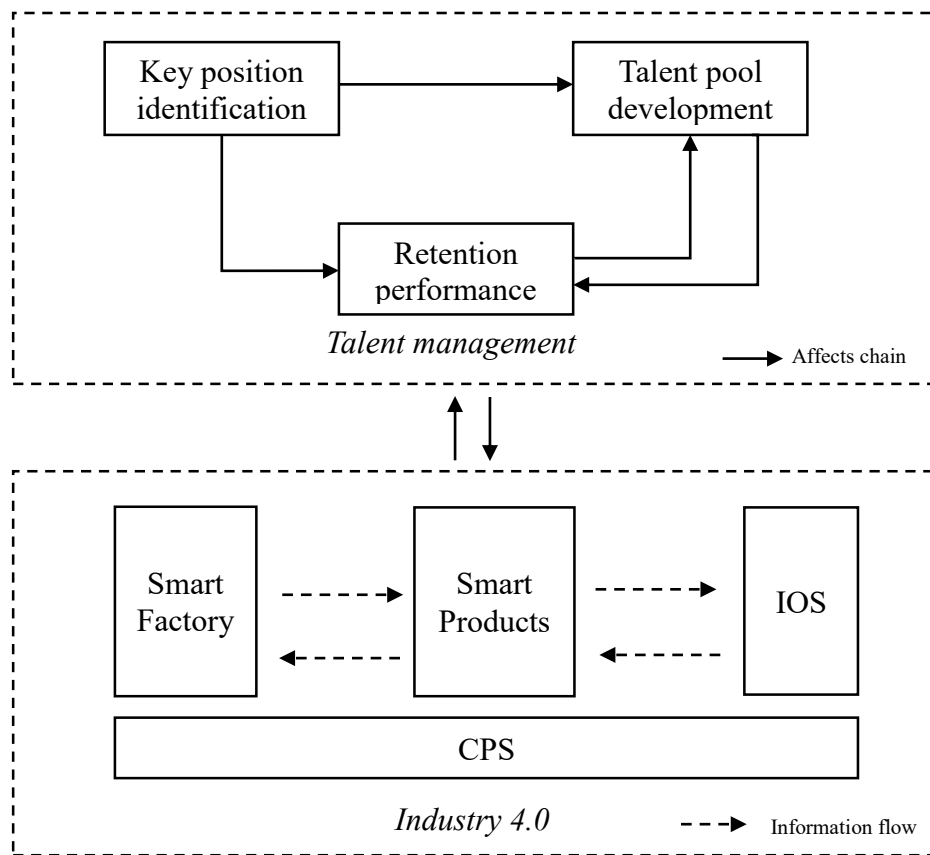


Figure 12. Study framework

The framework provides a few guidelines for this study. First, it suggests that industry 4.0 and talent management have influence with each other as a whole.

From view of talent management, the integration of industry 4.0 will be affected by the quality of talents. As the respond of key position demand, one main function of talent management is to fill high quality talents with suitable skill sets and characteristics into key positions. If talent management fail to fullfill this responsibility, key positions of company will be occupied by employees who are lacking the experience and skills to understand, plan and implement the integration process of industry 4.0. By the nature of key position, which is strongly related with the company overall performance, industry 4.0 can be seen with low acceptance rate among employees, long integration period, more complexity integration processes with higher investment, and low outcome after integration when there is a failure of talent management.

Except for the quality, quantity of talents will also influence the integration smooth since only when all key positions are filled with quality talents, industry 4.0 can provide the most outcome. During the integration process, lacking of talents will create unexpected delay in planning the implementation with other company functions and testing the industry 4.0 performance. After the industry 4.0 is completed integrated, empty key positions will then lead to missing links within the information loop. Although the loop will not break by one or two empty key positions, the efficiency and reliability can expect to be affected. Additionally, if the lacking of talent is the result of poor retention performance, company also have to worry about the leaking of sensitive experience. Those talents that were originally in charge or involve with the industry 4.0 integration process will very likely being targeted and stolen by the competitors due to the great demand in their experience. If such thing happens, company not only loss one talent with experience and skills to assist the industry integration process, but also let its competitor gain great knowledge advantage for the future competition.

While talent management have influence on the integration of industry 4.0, there is no doubt that industry 4.0 will introduce new standards and procedures into daily operations of companies and affects talent management in the meanwhile. In order to provide necessary support to the new business model that industry 4.0 creates, human resource

department have to change accordingly to keep up with the development process. Amount all the changes for HR department and HR function, talent management should be considered as the top priority due to its tight relationship with strategy performance of organizations.

When the Industry 4.0 changes the duties and responsibilities of many positions within MNCs, it is critical to ensure that individuals, especially those important talents, are mentally ready for the change and also capable of facing it due to their high influence degree towards the overall company performance. This requirement also alters the decision makers to keep human involve in the ‘data-information-decision-action loop’ when developing new IoT working process. (Albert, M., 2015)

There are some skills that are more/less important than they were before the implementation of industry 4.0, by which talent management should consider modifying the weights of these skills when recruit, evaluate and further develop talents. Take ‘Key-user’ position in the logistic department as an example: in nowadays, the major part of the daily tasks for key-users are ensuring delivery with special requests to meet its estimated time of arrival (ETA) while developing several projects for better performance of the department. Such tasks rely on the one person’s experience of handling special requirements, detail-focus skills and also creativity. In the future when most of the special requirements can be automated, which computer provide possibility for user to manage complex process (as what Key-user current spending most of the time with) rather than take over the user’s decision power, it will be more critical for Key-users to have better judgmental skills and creativity in solving the unexpected problems while special requirement handling experience having a less weight for achieving better performance.

Second, the variation of key positions demands corresponding talent pool development and retention strategy. The position identification will only affect by the organization characteristics but not the other components of talent management. Third, the performance of talent pool development and retention strategy are corresponding with each other and

therefore should be designed as a whole. And finally, the framework suggests that within industry 4.0, the information flows within will create a loop between the Internet of Things (Smart Factory and Smart Products) and Internet of Service when CPS served as the base of such information loop.

#### 2.6.8. Summary of the literature review

This study literature review has found the missing of organized paradigm of talent management study. The missing of paradigm can be viewed as the lacking of specific terms definition, inconsistency in basic understanding of study areas, imbalance between the focus on practical implications and theoretical framework and so forth. Furthermore, due to the short study period after these two concepts were raised (Talent management raised at 1998 and 'Industry 4.0' raised at 2013), there are no study focus on integrating two concepts together and analysis the future possible impact industry 4.0 will do to identify the key positions, develop talent pool and design retain strategy in multinational corporations.

Despite the spikes of talent management researches in recent years, this study can provide unique findings since industry 4.0 is a new industrial trend for not just manufacturing industry but the society as a whole, and provides more possible solutions for current existing problems within talent management. Even more, by changing the cooperation method and utilizing the value chains of organization in the new era, industry 4.0 expand the borders of talent management research (e.g. new positions that provide influence to organization, new corporation methods might change the traditional view of 'retention') and creates more topics for scholars to study with.

In general, this study will be able to contribute to not only the talent management but also human resource management as a whole by providing possible development insights to fill up the previous mention research gaps.

### 3. RESEARCH METHODOLOGY

This chapter will present the research methods that being used in this study. It will start with the description of research approach and design that fits the research questions this study provided in previous chapters. Following the description, this study will then present the data collection method and analysis procedure, finally ends by providing some basic background information of the case company.

#### 3.1. Research approach and design

Before collect and analysis the data for research questions, this study determines to clarify the research approach and strategy, at first, to understand and fully utilize the research methodology. In his textbook *Business Methods for Business Studies*, Saunders et al. (2009) had provided a widely accepted research method framework called ‘Research Onion’. See Figure 13 below.

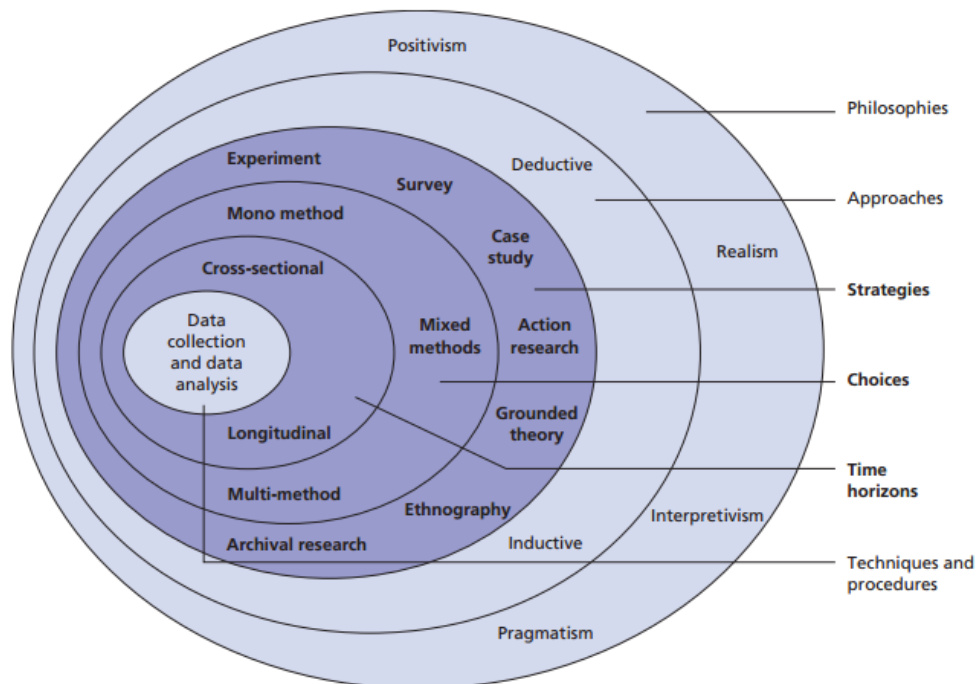


Figure 13. The research onion. (Saunders, M., Lewis, P. & Thornhill, A., 2009)

Despite the main focus of all researches are data collection and analysis for answering the research questions, Saunders et al. (2009) also believes that there are some important layers, which are the underlying issues for ‘the choice of data collection techniques and analysis procedures’, need to be ‘peeled away’ before we address the central point of argument. Starting from the outermost of research onion, research philosophy consisted of the most basic view of the world such as Positivism, Realism, Interpretivist, and Pragmatism. The research philosophy one study adapts greatly reflects how that study sees the world, and can be considered as the underlying cause of research strategy choice and all other choices within the strategy.

#### 3.1.1. Research approach

Follows the research philosophy, two opposite approaches to research: induction and deduction, formed the next layer of research method. At this stage, a study should consider the connection between the result of current study and the collected data. If current study is aim to develop one or more hypotheses based on the current theories, and test this/these hypotheses by empirical data, then the study is adopting a deductive research approach. In contrast, if the study is looking forward to building a new theory based on the understanding and analysis result of collected data, the study is considered of adopting a deductive research approach.

This study is adopting induction research approach as a result that the study is striving to understand what will be the factors that influence the Industry 4.0’s integration in MNC and what are the impacts that Industry 4.0 will bring to talent management in the MCS. Therefore, rather than testing the hypothesis, this study is aiming to provide a new angle of vision and deeper understanding through analysis the data in the research context.

#### 3.1.2. Research design

The inner circles of the research onion are research design. It consists of research strategies,

research choices and time horizons, which are the three most important components of a study plan that help to answer the study questions.

### *Research strategy*

Saunders et al. (2009) had mentioned seven strategies in his textbooks such as survey, case study, and experiment. These strategies either belongs to deductive research (e.g. experiment) or inductive research (e.g. case study) and can be used mutually inclusive (e.g. use survey strategy in a case study). Among all seven strategies, case study is considered as the best fit with the explanatory and exploratory research and address the ‘why?’ ‘what?’ and ‘how?’ questions. Mainly because the vague boundaries between the phenomenon that being studied and the context within which such phenomenon is being studied (Yin, 2003), case study often tend to use multiple data collection techniques within one study to ensure the reliability and transparency of the data, which Saunders et al. (2009) refer as ‘Triangulate multiple sources of data’.

Base on the fact that the study is aiming to gain better understanding of ‘What influence the Industry 4.0 integration in MNC’ and ‘How Industry 4.0 will affect talent management in MNC’, it is clear that case study will provide a better understanding of research context and the enacted processes, therefore, should be considered as the best fit for research strategy. Due to the fact that this study is trying to find out the opinions of stakeholders within one MNCs as a whole, it is more reasonable for this study to apply single holistic case study.

### *Research choices*

Research choices refer to the way in which study can choose combining different techniques and procedures for data collection and analyzing. (Saunders et al. ,2009) Based on the nature of data, the collection and analyzing techniques can be divided as quantitative, which is mainly used for numerical data, and qualitative, which is widely used for non-

numerical data. When a study decides to introduce only one data collection and analysis procedures technique, this study is defined as adopting mono method; in contrast, multiple methods refer the method when a study introduce multiple techniques for equivalent procedures. According to the combination of techniques, Multiple methods can be subdivided into two groups: Multi-method, which multiple collection and analysis techniques being adopted while all techniques are targeting the same data nature (either quantitative or qualitative), and Mixed-methods, which multiple adopted techniques can focus on different data nature. Nevertheless, these two groups can be further divided either based on the data nature they targeted (Multi-method: ‘Multi-method quantitative studies’ and ‘Multi-method qualitative studies’) or the procedure they are taking (Mixed-methods: Mixed-method research, which different techniques can be used parallel or sequential but not all the same time, and Mixed-model research, which study mixed different techniques and use it to collect and analysis data). This study, by the definition above, is applying Mixed-method research, and further explanation will be provided in the later section of this chapter.

### *Time horizons*

Depended on the time length of one study focus on, it can be either cross-sectional study or longitudinal study. Cross-sectional study usually targeted specific phenomenon at a certain time. Otherwise, if the study is focus on the study of change and development in a time period, the study is adopting longitudinal studies. This study is conducted in a relatively short time period and focus on understanding specific phenomenon rather than studying the change, therefore, this study can be seen as a cross-sectional study.

### 3.2. Data collection

As the study presented at previous section 1.2, this study conducted its data collection within case company Wärtsilä, which is a giant multinational corporation in the manufacturing industry that takes leading position. Wärtsilä had provided generous



assistance in providing necessary information and contacts, by which this study can collect essential data for the future analysis. Even though the study is built on one case company study, which Saunders et al. (2009) consider multiple cases is preferable due to ‘The rationale for using multiple cases focuses upon the need to establish whether the findings of the first case occur in other cases and, as a consequence, the need to generalize from these results.’, this study argues that this phenomenon does not have specific variation between MNCs and therefore the result can be generalized and apply into other MNCs. In order to achieve that, semi-structured interviews, which also known as qualitative research interviews (King, 2004) are set to gather the data of individuals’ opinions regarding talent management, Industry 4.0 and the integration between these two. By doing that, the study gains enough amount of data for later analysis process to discover the hidden patterns and dispute between the response of interviewees.

The data collection process consists two main stage a) selecting the appropriate candidates for interview and b) creating interview questions that properly guide the interviewees to provide suitable data.

#### *Interviewee selection*

In order to have a deeper understanding of the research question from every angle, this study strives to have the diversity of interviewee. Such diversity can be nationality, department, current working location, levels, duration within the company and experience of role shifting within the company. This requirement of interviewees received the fully supported from Wärtsilä and resulted in having interviewees with strong diversity.

Thirteen possible interviewee candidates were contacted by either personal conversation or invitation email. As a result, ten out of thirteen accepted the interview by which provided a reliable amount of information source and further ensure the reliability of sample. With the ten interviewees, eight located in Vaasa, one located in Italy and one located at Netherlands. Seven out of eight interviewees who located at Vaasa were interviewed by

face-to-face interview in order to provide a more comfortable interview phenomenon which enhances the communication efficiency, only one interview is conducted by video conference, also known as a part of the Internet and intranet-mediated (electronic) interview (Saunders et al. ,2009), due to the overlapping schedule between interview and business trip. In the meanwhile, all oversea interviews are conducted by video conference.

As agreed upfront with the interviewee, any specific background information of interviewee will be mentioned within the study in order to retain their anonymity. Meanwhile, basic description of interviewees group will be provided to deepen the understanding towards the information source of this study. Within the ten interviewees, seven were Finnish, and the rest are from Canada, Spain (Catalonia) and Netherlands. Five interviewees are from the logistic department, four from internal operation department and two from strategy function, except for that there also a certain level of overlapping in the roles and responsibilities in order to create compare group for the study. With five male and five female interviewees, this study gains a perfect balance in gender. In the organizational structure level, interviewees were able to be divided equally into two groups: one group contains supervisors and managers and the other group in general operational positions. See Table 1 below.

As for the background of interviewees, (see Appendix 2 for more information) all interviewees had been working in different departments though their professional career, and many of them ( $x=4$ ) have experience in working and/or living in another than their home country. Nearly all the interviewees ( $x=9$ ) have experienced at least once organization structure change, for example department merger or department management structure change, and the only person who never experience organization structure change joined the company only six months ago. Most of the interviewees ( $x=7$ ) had been working in different positions within the company but only two of them actually work at different locations while they change departments. By these experience, this study believe that interviewees are qualified to discuss important themes, such as 'current stage of talent management' and 'effects of technology to daily work', and will be able to share valuable

opinions of the future vision of both talent management and industry 4.0

The data collection process consists two main stage a) selecting the appropriate candidates for interview and b) creating interview questions that properly guide the interviewees to provide suitable data.

NAME	ROLE	YEARS IN COMPANY	EXPERIENCE IN JOB SHIFT
OP1	Operation	0-3	NO
OP2	Operation	0-3	NO
OP3	Operation	0-3	NO
OP4	Operation	3-5	YES
OP5	Operation	3-5	NO
SP1	Supervisor	3-5	YES
LM1	Line Manager	10+	YES
LM2	Line Manager	5-10	YES
LM3	Line Manager	5-10	YES
LM4	Line Manager	5-10	YES

Table 1. List of interviewees

#### *Interview question forming*

To achieve a consistent interview quality, a set of semi-structured questions were developed alongside the research questions. See Appendix 1. This set of semi-structured questions were set to provide a basic guide to the interviewees in order to obtain necessary research related information. Through this guide, interviewees were expected to answer ten basic questions that contain three themes: personal background, Talent management and research case setting, Industry 4.0 and its implications. Each theme was designed to provide specific relevant data that support one or both research focus: talent management and Industry 4.0.

Although the standard question set was developed to build up the basic interview structure and gain a general understanding of what are the general opinions of interviewees regarding talent management and Industry 4.0, the using of words when asking the question can variate slightly based on the current communication efficiency and familiar level of interviewee towards these questions. Also, due to the nature of communication flexibility in semi-structure interviews, the interviewer had combined several questions, changed the order of questions, rephrased the questions and added new questions to obtain more information from the current conversation.

Before the actual questioning section, short pitching and informal conversation that irrelevant with the interview were conducted in order to build up a positive and open communication atmosphere. Furthermore, three short introductions (between 2 minutes to 4 minutes) were also given before each theme of the interview to provide a better understanding of the concepts that interview will be later discussed. These introductions are a) Basic information of the study and interview structure b) theoretical understanding and practical examples of talent management and c) current vision and possible future implementations of Industry 4.0.

The interviews were conducted in January (20.JAN/22.JAN/25.JAN/25.JAN/26.JAN) and March (04.MAR/07.MAR/10.MAR/10.MAR/10.MAR) of 2016 with the duration of each interview between 45 minutes and 75 minutes. Despite the multiple native language background of the interviewees (Finnish <6>, Swedish <1>, English <1>, Catalan <1>, Dutch <1>), English is chosen as the interview language for all interviews to build up mutual understanding and also ensures the consistence of questions and answers quality.

### 3.3. Data analysis

In the methodology of the qualitative study, quantitative content analysis is the most common approach. It can identify the coded categorizes within interview transcripts and

further discover the primary patterns within those categorizes. (Saunders et al. ,2009) In order to discover the clear pattern, the data analysis begins with interview transcript, which transfer the audio interview record into the text document.

As mentioned before, seven interviews are conducted face-to-face, and three interviews are through internet communication software (Skype for Business). All face-to-face interviews are recorded by two separated equipment as backup for any possible technical problems. Internet interview, on the other hand, is recorded by embedded record function of the software without second devices. As an additional information to the verbal messages, notes were taken during each interview. After the last interview, all interview records and notes were reviewed and transcript with 72 hours to maximize the recognition of general patterns, differences, and important arguments within all the interviews. During the interview transcript, different colors were used to highlight different themes in order to prepare for the coding, which aims to reduce the less important information, further organize the valuable data and prepare them for the conclusion. This study assigned same meaning code (e.g. Lacking support from HR department) to different wording statements (e.g. *'HR does not comment anything about the development discussion'* & *'HR is not at all assisting personal development'*) to further reduce the interference information.

After the coding, data analysis moves forward to the categorize stage. The study first defined the main category (e.g. 'key positions identification' or 'talent pool development') based on the research questions. Follow by the second step, study organized the codes into subcategory which fell under the main category (e.g. 'lengthy application process' code into 'inefficiency recruitment' subcategory, which belongs to the 'talent pool development' main category). Once the coding and categorizing stage is finished, the study started to build up a matrix to compare the similarity and differences between the interviews and discover the pattern from the matrix. The final result of the data analysis will be presented in the next chapter (chapter 4).

As a common problem of the qualitative semi-structure interview, this study also occurs

abound of irrelevant information (e.g. repeated connecting words such as ‘emm, like, you know’ and over personal information such as ‘when I was age ...’). Such information was treated with caution and some selective left out of the data analysis section to ensure there are no distractors within the data.

#### 3.4. Background information of case company

In order to provide better understanding of the context in which the phenomenon was study within, this study will briefly introduce general information of case company. Wärtsilä is a Nasdaq (Helsinki) listed multination corporation in manufacturing industrial sector. Focus on proving the advance technology and complete lifecycle solution in both energy and marine market, Wärtsilä reached 5 billion EUR net sales in 2015. It is currently operation in more than 200 locations in over 70 countries with approximately 18,800 employees.

The current state of HRM in Wärtsilä is geography-based, in another word, there are individual HR departments who take care of HR activities for subsidiaries in every location Wärtsilä operates. It is not clear if there is global HR department that take cares of the global HRM strategy since every function (Marine Solution, Energy Solution and Service) has individual HR departments but without clear responsibility distinguish them from the subsidiaries HR department. There is no consistent HRM strategy is clearly stated for every HR department to implement, not to mention talent management strategy. The main tool for the HR department to operates with is SAP system, the existence of other possible tool for HR activities remains unclear. Based on the facts above, we will be able to concludes that the HR function in case company is mostly on operational level that focus on tactical and transactional activities when strategies and long-term plans are seldom within agenda.

As a technology driven MNC, Wärtsilä has strong technology advantage in its product, service and operation activities. Digitalization is officially recognized as one main success factor to implement for better performance in efficiency. Take warehouse as example, automation collection robots are enabled for a few years in the Wärtsilä main warehouse

in Netherland which greatly improves the logistic efficiency and reduces the reaction time in delivery collection. In the near future, technology such as Radio Frequency Identification (RFID), hologram labels can be expected to further develops the productivity in logistic chain.

## 4. RESEARCH FINDINGS

In this chapter, this study will present its finding that support by the previous literature review and the thorough responsive analysis from ten interviews. This interview analysis helps the study to understand and, furthermore, develops the in-depth understanding of what is the attitude of normal employees, talents, and line managers towards talent management and industry 4.0.

### 4.1. Overall finding present

The analysis result in a total 274 codes, 18 subcategories and 6 main categories. The results are organized and can be seen in the table 2.3.4 below in later sections. Each table contains at least one main categories and multiple subcategories to present a specific theme related to the study: current stage of talent management (Table 2), overall effects of Industry 4.0 integration (Table 3) and influence of Industry 4.0 to talent management (Table 4). In each table, subcategories will be present at the first column on the left and the codes belongs to that subcategories will be present at the second column of the left. After each code, there is a bracket to show the frequency of occurrence as (frequency of occurrences in all the codes/number of interviewees mentioned the code). For example, the code ‘Lacking support from HR department (6/5)’ indicates this code occurs six times from five different interviewees. In order to further support the findings, this study included several direct quoting from the interviewee which will be presented in italic. The name code, which can be found at previous table xxx, of the source will be presented at the end of each quote. (e.g. Basically my understanding is [ ...] OP1) This study also would like to point out that due to the loose structure of the semi-structure interview, not all the determine factors are discussed within every interview to have a general impression of the most discussed component/determine factors, and furthermore determine the importance level of each determine factors.



## 4.2. Study framework overview

To start with the analysis, it is important for the study to firstly point out that that as an industrial trend, industry 4.0 contains not only technology development but also the corporation changes. In which means industry 4.0 will affect both the determine factors belongs to the three component of talent management and the way these three components affect each other.

In the framework from the theoretical chapter, two main boxes with the dotted line: industry 4.0 and talent management, are the key research target of this study. Three components of talent management: key position identification (KPI), talent pool development (TPD) and the retention performance (RP) are presented in solid line boxes, so as the major components of industry 4.0: Smart Factory, Smart Products, CPS and IOS. The solid arrows within the framework indicate influence direction, no matters if it is between the components or research targets, and the dotted arrows indicates how information flows within the system.

Talent management, as mention in previous chapters, ensures the basic resource of integration not only industry 4.0 but also all other industry trends. By appointing suitable talents with corresponding skills, characteristics and experience to specific key positions, talent management ensure the necessarily of integration industry 4.0 can be understand by most of the employees. Along which, these talents will also play critical role in planning the industry 4.0 integration, testing the integration result while providing improvement suggestions, and coordinating the integration with other company functions to ensure the steady outcome during integration process. Additionally, while maintaining enough quantity of the talents, talent management keeps all key positions filled and function with high consistent outcome. Through which, the real-time information loop of industry 4.0 can remain its best function with efficiency and reliability.

Correspondingly, industry 4.0 will bring new standards and cooperation methods into the

company daily function, which generates new demands to the talent management such as creating new key positions/removing traditional key positions, raised new demands for talents while changing the way how company develop and retain its talents.

Within talent management the components also influence each other in different levels. KPI of one company will greatly affect their demand of talents to fill these KP, which requires the company either self-develop and/or self-identify these talents in ILM or seeks out these talents in ELM to fit the demand. However, such seeking behavior, like ‘Law of Supply and Demand’ (Mankiw, G., 2010) from the basic economy, will affect the supply of talents and creates a natural loop of supply-demand balance. Furthermore, the performance of talent pool provides the basic guideline for retention activities to fit in (e.g. Demand of certain skill will result in personal development direction) and also affects the supply of both ILM and ELM. In the meanwhile, KPI of one company affects the retention performance as providing development target for the employees to follow.

As the starting point of talent management process, KPI provides the specific requirements of experience, personalities and/or skillsets for talent pool to search in both ILM and ELM. In case there are no available talents in both ILM & ELM, KPI provides a clear target for retention activities to synchronously provide training and development path for potential employees. As if there is a suitable talent fits the requirements, the talent pool then needs to react rapidly in selection and assessment process in order to fit the KP and avoid added-value loss and significant damage in KP performance failure. When a KP being successfully fit by talent, he/she should receive personal development discussion for the company to understand their vision and provide development support accordingly. In the meanwhile, other directly related factors such as compensation, work-life balance (WLB) and relationship quality with the direct boss should also be taken care by either direct line manager or the HR department. The outcome of these retention activities will be highly affected by the resources and information talent receive from talent pool, and this outcome will correspondingly influence how the talent pool further develops.

After the framework been briefed theoretically, this study will now continue to present the research finding further. These findings will first present the status of three components in talent management, follows by the speculation of how this status and other factors affect the integration of industry 4.0 and continues with the overall effects when industry 4.0 integrates into company. Influence of industry 4.0 to talent management will continue as the end of finding presenting, and the chapter will be concluding with a short summary of all findings.

#### 4.3. The status of talent management in a technology driven MNC

The attitude of one employee regarding talent management is determined by their knowledge and experience of talent management. Talent management, being discussed in previous chapters, is formed by three components as key position identification, talent pool development, and the retention performance. At this section, this study will present the opinions of interviewees regarding the current/past talent management they understand and leave their ideas of how future talent management should be developed in future to the last section of this chapter. Table 2 below presents the summary of talent management status in case company.

Although not organized as an individual code, this study finds out that the talent management concepts are unknown to most of the interviewees ( $x=8$ ). The only two interviewees who are familiar with this concept are newly graduates from Master program of International Business, which they claimed that related concepts and theories were taught in the human resource class. Such condition indicates the missing of clear stated talent management strategy within the case company, which will lead to the inconsistent of talent quality and the low quantity of talents.

Subcategories	Codes
Key position (main category)	Is critical to organization (3/3) Is working with external stakeholders (2/1)

	Obtain more resources and opportunities (2/2) Would be unfair if apply (1/1)
<hr/>	
Talent pool development (main category)	
Recruitment	Is one key function of talent management (3/3) Has inefficient process and outcome (3/3) Need to focus on forecasting the future demand of skills set (1/1)
Selection and assessment	Promotion standards favor on technic skills rather than business/development ability (1/1) Lacking resources make LM conduct incorrect selection process (2/2) Lacking training make LM conduct incorrect selection process (2/2)
Internal Labor Market	HiPo program can further develops talents' problem solving skills and provide solutions to actual problems (1/1) Lacking support from HR department (6/5) Lacking communication between subsidiaries (4/2) Lacking clear target and goal for job rotation (1/1)
External Labor Market	Have a lot of competitions (2/2) Should have reaction regarding the market demand (1/1)
<hr/>	
Retention performance (main category)	
Personal development	Has style differences between cultures (3/3) Is highly related with Line manager (8/7)

	Is one key component to ensure retention performance (2/2) HR offer certain development courses (2/2) HR provide little help in personal development (6/6) HR should involve more with the development process (4/4) Different opportunities create higher mobility (1/1) Peer pressure creates higher mobility (1/1)
Relationship with direct boss	Stabilized management level will enhance the performance (1/1)
Compensation	Is critical to motivates talents (2/2)
Work life balance	Flexible working culture has positive affect on retention (1/1)

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Table 2. Current stage of talent management

#### 4.3.1. Key position identification

Being the first phrase of talent management, this study found that the key positions across the organizations usually have three characteristics in common: a) High value-adding, b) Scare experience and/or skills needed, and c) High risk in failure.

First of all, it is a surprise for the study to learn that none of the interviewees (x=0) consider they are currently working on, or had been working on ‘key position’ that has critical impact on the overall company strategy, while one interviewee clearly states that such concept of diving positions into ‘key position’ and ‘general’ would be unfair.

*“(is there key positions?) I wouldn’t say so because of course you have the CEO which is more important than the others. (but) not that I would react on in a way, not that in a way it would be unfair” LM3*

This fact provides this study a strong support regarding the differences between global management styles: MNCs from America seems natural to distinguish important roles from general ones and provide these roles more resources and attention as a formal policy, while in some other areas, say Nordic, such behavior might be seen as an unequal, if not unethical. However, while rejecting the ‘key position’ concept, some interviewees (x=3) admits that there are certain positions are indeed plays more important role in the overall company strategy even though their importance are not clearly indicated in the official statement.

*“[...] quite often I hear talking about for example, well ... coordinators themselves, for example keep comparing themselves with other positions where they fell like ‘ok this position is something which is not value as much for the company as the other ones are’ [...] And I don’t know ... in Wärtsilä seems quite often that technical positions are more valued, or seem to be more value than for example to commercial positions if you can say so.” LM1*

When discussing these underlying key positions, interviewees (x=2) believes them are usually granted with more resources and for those who are in these positions, they usually gain more opportunities to develop themselves than other positions. One interviewee also considers that except for the technical positions who are traditionally being consider as underlying key positions inside the company, positions that are dealing with the external stakeholders are considered to be more important than positions focus on internal process.

*“[...] maybe because purchasing team is working with the external department, I mean non-Wärtsilä departments quite a lot [...] we work only with the internal departments; we have no ... basically no outside contacts with anyone so it’s only internal work in that sense. So I think that might be one of the reasons why there is the differences.” OP4*

#### 4.3.2. Talent pool development

When the interview asks interviewees' opinion regarding talent pool development, interviewee shown different approaches based on their background and current positions. Interviewees who are currently working at operation role mostly express their interest in the demand of talent pool (recruitments, selection, and assessment) while interviewees who are at the managerial positions tend to focus more on the supply (ILM, ELM). Despite the differences of focus, attentions (mostly complaints) towards ILM from both OP and LM are noticed by this study and will be further discussed in later section.

##### *Recruitment*

Most the interviewees who mentioned recruitment within the discussion (x=3) consider recruitment is one of the most important function of talent management that identify and obtain people who have essential skills for the company.

*“[...] it is really important to identify and recruit those talents, it's like hidden knowledge that people have, and it's very important to take advantage of those hidden knowledge. It's good for the people who have it because they feel themselves useful, and it's also of course good for the company because then they can benefit from it. But unfortunately in quite many positions they don't actually pay too much attention on this. “ OP2*

As the statement above, lacking attention usually limits the outcome of recruitment. Other factors such as lacking and resources of identifying the talents and the missing of support from HR department are also creating inefficient recruitment outcome. Among all problems, inappropriate recruitment process should raise the most attention to the decision makers not only because it create negative outcome of recruitment process and possibly leads to incorrect person in key position but also because it has the risk of slipping from 'inappropriate behavior' to 'unethical behavior' that risk the company reputation.

*“[...] got so many applications so if she already knows someone or she can ask around from her current employees [...] if they know and then she looks more into that person so. [...] she said she doesn't even read them all because there is so many and she doesn't have the time. Then I think that is wrong because then there should be somebody who is able to do that” SP1*

Additionally, one interviewee states that in nowadays recruiters are making decision based on the past performance and current positions rather than the future growth potential, which should be considered the most important reason for the company and this situation should be further developed in the future.

#### *Selection and assessment*

While recruitment is more focus on identifying and attracting the talents from ELM, selection and assessment usually focus on ILM: locate those talents who are already inside the company, assess their performance, and promote/shift them into an empty KP.

Most of the interviewees (x=7) had worked in more than one positions within the company, and many of them (x=5) gives a positive feedback on their experience. For those (x=2) who believe selection process had been conducted incorrectly, one states that there was a clear favor on the technic skills of candidates when there is a promotion, the business/leadership skills were usually undervalued, but the situation had been improved.

*“[...] sometimes you might have, as a leader, a person who is very highly knowledge, and very good expert in something, a specialist in something, which then promoted as a leader just for the longer carrier for example or good experience, as a technician. But then again, having no experience in people's management. That is something what I feel, but I guess we are getting more, rid of that more and more.” LM1*



When being asked what are the reasons behind incorrect selection and assessment process, both interviewees believe that the missing of resource and training towards the person who in charge of selection and assessment should be the main reason. As they mention, selection and assessment had and still always been a part of the responsibility of LM or the direct manager of LM, who are not well trained to select the talents and also lacking time and energy to do so. To solve the problem, HR should provide more support such as related training courses and conduct the primary selection process before passing the candidates to decision makers.

### *Internal labor market (ILM)*

Served as the internal talent pool that, theoretically, tailor made for the company, ILM is the most important tool for the company to keep their talents. ILM provides development opportunities for talents to further prepare themselves for the future career, it also shares the information of empty slots inside the company for talents to take one step further in their careers and to create more added value to the company. However, the current status of ILM in case company is far from perfect, negative impression of ILM will, if not already, affects the retention performance and further leads to the talent loss.

When ILM being mention in the interview (x= 5), the result comes out mostly negative, and the biggest problem shown in the current ILM is missing support from HR department, which interviewees consider should be the department in charge of the building and development of ILM in overall. From OP's view, HR is not proving enough proactive assistance in suggesting the development opportunities and career path, which this study argues it should be the responsibility of LM in retention performance rather than in ILM. From LM's view, HR is not reacting enough to the demand of positions and provide development opportunities such as courses, traveling, job rotations and so forth.

Additionally, for the interviewees who had been working in the different location of case company, isolation between different subsidiaries create the most difficulties and confuses

when they are moving from office to office. According to the interviewee, HR department within different subsidiaries behave poorly in internal communication, and most of the HR related process is being done by interviewee without the support from neither party. Such experience easily raised the confuse and loss of belonging feeling of talents, some might affect the motivation of work, and cause talent loss to the company as the worst scenario.

*“The destination country [...] they see me as a new employee who is coming outside of the company [...] they don't really recognize the past that I've been working in Wärtsilä. [...] The thing is that there should be only one Wärtsilä, but that's not really the case always-its quite of a challenge since it is still a global company and people are moving around [...] I feel that they haven't been actually communication at all. I think I've to be the middle of the whole communication so I've been passing the messages around.” OP4*

#### *External Labor Market (ELM)*

In recent years, the rapid change business environment and the decline of educated labors in the main markets make the company experience less efficiency respond when filling their KP slot from ELM. Interviewees (x=2) admits that company is usually facing a significant competition in ELM nowadays which leads to a longer reaction period. The company should invest resources in market education, such as investing education programs, public development programs and so forth, to accumulate the ELM supply react to market demand.

#### 4.3.3. Retention performance

Among all the determine factors, personal development is the key issue that being most frequently mention by our interviewees (x=7). It was considered curtail to keep talents motivated and loyal by providing them enough opportunities to further develop and challenge themselves. Such activities are considered by the interviewees (x=7) to be highly

related to the performance of line managers, who provide development discussion, pointing out the possible development path and assist talents to achieve their goals.

Although it is recognized as the key influence factor to the retention performance, sometimes the outcome of people development activities are as people expected. Interviewees believe that one reason for the gap between expectation and performance might be the different management style between cultures. For example, in some culture, it is considered impolite to discuss the personal future planning in work while in some culture such discussions are always brought up by the employees voluntarily.

*“I think that the HR in Netherlands is a little bit more active over there (when compare with) Finland for example. [...] in Finland the HR does not comment anything about the development discussions, and doesn't guide you and doesn't give any tips. ” LM2*

HR department gets many complaints when most of the interviewees (x=6) claim that HR is not providing enough or not providing at all helps in the personal development activities. All line managers consider HR as ‘silent back office’ who only provide assistance when you approach them in the first place, and not provide any proactive suggestions or assistance to help out the personal development process. Without doubts, LM believes this situation makes their development suggestion towards the talents are vaguer than it should be, and HR should solve this problem by getting more involve with the personal development process of talents and provide proactive assistance to the line managers who actually conduct the personal development guides to talents.

*“Not at all, not really, no and no. They've been assistant, (in) a bit more administrative back office. [...] there is the frustration that you need to do everything yourself in a way ... really not this kind of proactive way of working and helping out but more the struggling in a way to get some (help) ... of course they would like you when there is a need, but otherwise I would feel like they are more*

*like as the administrative back office that might also annoy you sometimes not being kind of (helpful) ” LM3*

Higher talent mobility is one another issue regarding the retention performance in recent years, which we’ve briefly discussed in the last chapter. The interviewees who addressed this issue believes that the rise of mobility is created by the massive amount of new opportunities along with the technology to access those opportunities. As a result of high mobility, it sometimes creates a peer pressure for the talents to change positions, no matter within the company or towards other company, just to react to the peer pressure.

*“[...] if I think of the department, our department for example, it comes quite much also from the pressure of the colleagues. You see people leaving constantly and you get the feeling like ‘ok I also need to go because it’s like ... unnatural to stay here for over ten years or so’ So I think it depends much on the place you are working in.” LM1*

#### *Relationship with direct boss*

*“[...] if you think that you have one manager you get along really well and you have this kind of plans what you are going to do, and then that manager leaves and you get a new manager who you are not (familiar with) maybe (the plan will then drop away) ... because it is all about human relationship [...]” SP1*

It is clear that since the personal development plan guidance is usually conduct between talents and their line manager, the relationship between talent and the manager usually plays an important role when implementing the plan. Furthermore, the direct manager fails to create a propitiate working atmosphere for talents to follow, or some talents simply are not used to the management style of their direct boss, it will most likely enhance their willing of searching other opportunities.

*Compensation & Work life balance (WLB)*

*“At least I will still like to work for Wärtsilä because Wärtsilä is in a way pretty good employer: pay check is pretty good and we have flexible working culture and so on” SPI*

When considering any positions, compensation and are always important for the talents to evaluates. However, as we mention before at the theory chapter, competitive compensation usually provides extra motivation for talents but can hardly be seen, and should not be considered by the decision makers, as the primary reason for talents to choose one position since there will always be a higher bidder in the market. The Same situation applies to WLB: a well-organized WLB can further ensure the motivation and loyalty of talents, but for most of the people it will not be the most important factor when evaluating the opportunities.

*“And also pay competitive rates and offer opportunities for career growth and expansion development in order to actually provide external motivations as well” OPI*

In conclusion, this study found that in the case company, a typical technology driven MNC, talent management is mostly conducted by the line managers and so far the outcome is still acceptable. Top managers from the case company, possible due to the culture differences, did not implement a clear strategy of talent management, which naturally leads the HR department remain as a traditional administrative back office without much support in developing talents. Line managers, on the other hand, is fulfilling the responsibility of talent management such as selecting, developing, retaining the talents they manage.

In the three main components of talent management, key position identification was never clearly stated by can still be observed by employees. The favor towards technical skills and experience rather than business ones can be identified, the preferential of positions that

dealing with external stakeholders are also obvious. Dispute the missing of HR support creates some problems for the development of talent pool, the performance of which can still be considered positive. Same condition applies to the retention performance as well: although the WLB and relationship with direct boss are both positive, personal development factor limits the overall performance of retention rate while such limitation is again created by the lacking support of HR department.

#### 4.4. Attitude towards industry 4.0 and its integration in MNC

Attitudes of new technology usually determine how smoothly can one technology be introduced and implemented within the company, same rule apply to the technology trend. As the new emerging business trend, industry 4.0 is not well known to the interviewees. (x=0) In order to provide a basic concept for interviewees to grasp, interview started with the questions regarding technology as general, then continues with introduction of industry 4.0 and concluding with the benefits, barriers and the methods to integrate industry 4.0. See Table 3 below.

##### *Technology in general*

As mentioned above, to build a basic picture for interviewees to understand what might happen while industry 4.0 integrates into the case company, this study starts the third interview theme of the interview with the questions regarding overall impression of technology.

In generally, technology leaves a positive image for interviewees. Most interviewees (x=6) believes by implementing digitalization strategy, automation system and algorithm provides a great help in reducing the daily manual routine work, raised the efficiency to another level and changed the way of working. For example, when the implementation of automation system in warehouse, people no longer need to drive the forklift from shelf to shelf and collect different spare parts base on a paper packing list: with the help of automation, warehouse worker only need to scan the barcode on the packing list, and

recheck the spare parts that collected by the machine before it goes to packing station.

Subcategories	Codes
Technology in general	Reduce daily manual routine work (7/6) Chang the way how people work (6/6) Raised the standard skill set demand (5/4) Make people over-rely on the technology (4/4) Worsen the WBL (2/2) People will always be needed (6/6) Has positive effects to the business performance (2/2)
Benefits of Integrating Industry 4.0	Able to further utilize raw data (3/3)  More efficiency to deal with the routine tasks (7/7) Real time information enables fast reaction on unexpected situation (10/7) Well analysed data support better outcome of decisions (3/3) Ability to forecast the demand and act one step ahead (5/5) Ability to achieve variable demands from customer (2/2) Higher planning flexibility (5/4) Able to Create new jobs (2/2) Able to further achieve cost efficiency (2/1) Able to gain better competitive advantage (1/1)
Barriers of Integrating Industry 4.0	Greatly change the nature of daily tasks (1/1)  Loss of motivation due to personal interests (4/4) Loss of creativity (5/5) Will lead to massive lay off (9/8)
Methods that support the integration process	Open Communication (3/3)  Process transparency (1/1) Support from top managers (3/3)

Table 3. Overall effects of Industry 4.0 integration

With no doubt, such integration of technology greatly raised the business process efficiency and created positive effects to the company's performance. However, it also brings up some deeper problems. One of the most obvious problem is massive layoff that leads by the higher efficiency in manual work. With less manpower needed for the daily process, most interviewees (x=8) believes that a massive layoff, at least in most of the non-knowledge driven positions, will happen. Another problems is some skills we think essential a few years before is now considered as the basic requirements for the positions, and some skills are even considered as irrelevant for the same function. In another word, the basic standard demand of positions is raised along with the integration level of technology, while the whole 'demand skills database' being updated.

*“If somebody, if everybody just started putting Microsoft excel, Microsoft Office skills, it seems that it is something almost standard these days you need to have on your resume to show that you can work in another office based environments with basic Microsoft skills and tool.” OP1*

While digitalization provided more options in the location where people are able to work with their tasks and faster information gathering speed, it also blurry the border between work and private life. As a company which operates in over 70 countries, it is essential for case company to be online 24/7 to provide quickest service respond to their customer. The mixed between work and personal time under this pressure might be acceptable for some talents, but it would almost certain create a negative impact on the WLB.

*“The negative part is that the business is always following you. I have the business cell phone and wherever I go, I would have to take my work phone with me. I consider that it is not always a positive.” OP5*

Although there are a lot of arguments that the development of technology will finally lead to the fully automation, which no man will be needed for business, most of the interviewees (x=6) are still holding the positive attitude that there always will be some responsibility



machine and technology cannot do, or at least not as efficiency as human being. In another word, interviewees believe that even though the development of technology requires less manpower and creates massive layoff, people should and will always find their unique position in the new business model, the demand of talented employees will never be fully replaced by algorism and machine.

*“Still, I do believe that certain jobs cannot be replace by automation, at this moment at least [...] I still do believe that people will and are need in order to monitor, to really conclude and make the decisions.” OP5*

#### *Benefits of integrating industry 4.0*

An essential benefit for the company to integrates the industry 4.0 is that company will be able to identify, collect all the raw data from daily functions, through algorism that embedded with the system or server, these data can be further analysis and utilize in order to provide data support for all the other actions.

*“My very high level kind of understanding is, without going all the details, it’s like it more about the fact there is so much raw data out there now, that it’s about having people who are able to use that data to make more efficient [...] processes, more efficient planning” OP1*

Just as OP1 mentioned above, all the data utilization will finally come to the result which is achieving a higher level of efficiency. This opinion is also being frequently mentioned by other interviewees. (x=7) By the definition of Oxford dictionary, efficient is ‘(a system or machine) achieving maximum productivity with minimum wasted effort or expense’. (Oxford, 2015) It suggests that the maximum efficiency can be reached only when productivity, which measured in terms of the rate of output per unit of input, is maximum and input is minimum. For minimizing the time input and maximize the outcome, assist by big data and cyber physical system, industry 4.0 can shorten the time input on both routine

daily tasks and the reaction time of emergency situation. While provides better working procedures and options for people to follow in the daily work like most of the technology does, industry 4.0 enables the machine that has accidental situation to communicates with other machines within the information network. By which it breaks the traditional command chain, which information have to be pass from layer to layer (so as the decision), and enables the direct notice and react of direct stakeholder to solve the problem. One good example of this situation is that industry 4.0 will have the ability to forecast more accurately the demand of customer and act ahead accordingly.

*“I like the part you describe as ‘being one step ahead’ that’s one of the thing that we are actually thinking today as well. [...] This is one of the biggest opportunities I see.” OP5*

Another essential benefit being identified by the interviewees (x=4) is the flexibility that industry 4.0 able to provide. Based on the well-analyzed data and the maximized efficiency mentioned above, industry 4.0 enables more flexibility in daily work. For example, it will be able to detective the idle time of machines and rent the usage power of the machine to small and medium size companies who is not able to afford to own the machine, or it can use this idle time to product smaller patch/customized orders to provide better customer service.

*“Now our system is really inflexible ... there is still quite a lot of manual work and manual figuring out that have to be done. So I would see definitely more benefits on that [...] I do see beneficial.” OP5*

With the improvement of efficiency and better customer, it is natural that the company with gain more competitive advantage than those who do not embrace the newest trend. Furthermore, such development might also be able to create new positions to both ILM and ELM, which further affects the demand of talent pool development.

*Barrier of integrating industry 4.0*

There is no revolutions success easily in history, when there is new force raise and push the development forward, there is always old force that rooted in the current environment and create barriers to the new force. The most identified barrier, which is also the possible risk that raised the most attention (x=8), is the integration of any form of automation, including industry 4.0, will lead to lay off, the deeper automation embedded, the bigger lay off there will be.

*“If your job consistence entirely of pushing the same repetitive bottom that in any job, physical or office based, it will be eventually replaced by automation or a cheaper bottom pusher” OP1*

Even though most of the interviewees admit that there will very likely to be massive lay off if company integrates industry 4.0, a big part of them still consider that it is a nature stage of business process that people cannot avoid with or without the integration. People have to admit that and try not to be replaced instead of resisting the trend itself because if the company did not stay with the trend, it would eventually lose the competitive advantage and force to cut the cost. At that stage, even bigger layoff will take place, and the damage will be worse than the integration.

*“I still don't think it is an alternative in a way like that where it is going (elsewhere). We need to change because maybe you get automatic and people get to work less on (their current work) but that's the development we have (and it is) on-going. What need to be done is of course to change (and seek) other type of knowledge that is required to maintain this (change) and you (as employee) have to go along with that one (requirement).” LM3*

Compare with the indirect effect on the reputation of company that the layoff might cause. Interviewees are more worried about the creativity loss and motivation loss which create

direct impact to the outcome of talents.

*“In a way it takes away in deed a certain way of creativity. For instant [...] it doesn't challenge people anymore in order to challenge other functions actually. [...] 'this is what my system said so it is right'. In that way I would day that it did takes away a bit of, called it ownership and creativity in general, that's in deed what I do believe.” LMI*

Repeating the routines by the suggestion of system data, interviewees afraid that talents will trust and rely on the system more than they should be and lose the independent thinking ability when accidental situation comes. Also by the changing of daily tasks nature such as communication target shifting from people to machine, some talents might lose interest in repeating daily work and unable to provide consistent outcome as they used to be.

*“A lot of her sale was like cold calling or keep up with leads and contacts, which a lot of it use to be done over the phone or in person. But then once they start getting to put all the information into a computer system, [...] which told you when to respond to certain people, when to send emails or how to tack emails [...], she started to losing interests as well because that again was not along her skills set [...]” OP1*

*Methods that supports the integration process*

*“Unless you have someone pushing further and explaining why technology is being adoptive, you will never have all the support. (If) one don't see the value in it, they don't see it's a better way of doing something in the past then they will always just to revers to the older easier way of doing things. So they really have to be supported by top management, and not only supported by top management but realized their job is actually on the line.” OP1*

When being addressed the follow-up question regarding how to overcome barriers to the integration of industry 4.0, interviewees highlighted one key action: communication. Interviewees suggested that the biggest problem of new technology integration always lacks of understanding and information, which leads to wild assumptions and imaginations that sometimes further leads to negative first impression before the technology been implement. It is important that management level, especially top managers, ensure the openness and transparency of the future plan and possible impacts. Only by this way, talents will be able to know for sure what might happen at when, and how it will affect them in person. Moreover, through the understanding, they will be able to prepare mentally for the changes and maybe even start on some development process to obtain related skills for the new change.

#### 4.5. Impact of industry 4.0 to talent management development

After all discussion above regarding talent management and technology, it is the time to discuss what would happen on talent management if industry 4.0 is integrated into case company. For key position identification (KPI) and talent pool development (TPD) factor, which talents have little effect on, this study will discuss them separately as normal. As for the retention performance (RP), which talents have the ability to react proactively on, this study will divide it into retention performance – individual (RP-I) and retention development – company (RP-C) and present the result separately. See Table 4 below.

Subcategories	Codes
Key position Identification	Shifting of KP can be foresee (4/4) Tech positions will be more important (7/7) Managerial position will be more important (2/2) KP Will gain even more power (1/1) Gap between general and KP will get bigger (1/1)
Talent Pool Development	Standard of talent will be further developing (2/2)

	<p>Require individuals to have the ability of learning (5/4)</p> <p>Require individuals to have the ability of adapting (7/6)</p> <p>Communication skills remains essential (3/2)</p> <p>Data interpret skills becomes important for decision makers (2/2)</p> <p>Need to remain human factor into consideration (1/1)</p> <p>Standardized in planning, localized in talent identification (1/1)</p> <p>Recruitment process will change - focus on forecast the future performance (1/1)</p> <p>ELM - Education will change to fit the new demand (1/1)</p> <p>ELM - Labor market will have faster reacting (1/1)</p>
Retention Performance - individual	<p>Stay open-minded (6/6)</p> <p>Proactively develop yourself (6/6)</p> <p>Will have less mobility (1/1)</p>
Retention Performance - company	<p>Ensure communication efficiency (8/7)</p> <p>Provide development opportunity (6/6)</p> <p>HR responsibility need to be developed (5/4)</p> <p>Respect and trust (2/1)</p> <p>Demand from talent might change in the future so the meaning of retention will change as well (1/1)</p> <p>Need to retain and utilize the slow adapters who have experience (1/1)</p>

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Table 4. Influence of Industry 4.0 to talent management

#### 4.5.1. Key position identification (KPI)

When discussing the possibility development in KPI, many interviewees (x=4) believe that there will be a shifting of KP in the future. With the development of process efficiency, some current key positions, for example, material purchasers, can be replaced by the

algorithm that analysis offers from all different suppliers and locate the best options for decision makers to make further contact and negotiation. In the meanwhile, some positions, such as system maintenance, who constantly develop one or more company system and ensure its function, will become more value able when the system become more and more important and complicate. Within this shifting, most of the interviewees consider that the technology related positions such as system maintenance, software developer, big-data analysis and so forth, will create the most of the KP.

As the automation take over most of the normal routine tasks, some interviewees believe that KP and managerial positions will have more power since they are having a bigger portion of influence towards the outcome than in nowadays. As a result of such situation, the gap (skill, experience, resources) between general positions and KP will get even bigger than it is right now, which will potentially create antagonism between these two group of people.

*“I think marketing will always be important but maybe some other positions aren’t that important anymore. Maybe this kind of transitioning more technical environment causes that these technical positions and higher management positions are even more value than they have been.” OP2*

#### 4.5.2. Talent pool development (TPD)

Along with the development of KP and the changes within the company, interviewees see that the new standard of talent is on the way. Among the new standards, the ability to learn (x=4) and the ability to adapt (x=6) are being considered as the most curtail to fit in the new system.

*“Well definitely what is needed in that people who are quick learners that they can develop themselves and to go forward, adapting the changes instead of fight against them ... but the strength in the future it would be changed and I think that*

*who is the fastest learner is better than the one who are little bit more wont (learn)” LM3*

Proven by the history, the speed of business is rising faster and faster, one skill (e.g. Microsoft Office) might be seen as rare and essential of a talent to obtain might be the basic standard for everyone. Talents must have not only strong ability to learn new skills and knowledge but also the ability to adapt rapid changing business/working environment to step further in their career path.

*“From a personal perspective I think people need to realized that no job remains the same, you can’t do the same thing in your entire life, that might be companies like that or jobs you can do it like that 100 years ago, but now, especially with nowadays technology, nothing remains constant. You always have to be learning, you always have to be growing and developing as a person.” OP1*

For decision makers, it is crucial to obtain the data interpret skills. With the massive amount of data that being collected and analysis by the machine, it is decision maker’s responsibility to ‘decrypt’ the underlying message that hidden behind the data. Although the machine can collect and analysis data, sometimes even able to provide suggestion accordingly, it can never see the full picture as human does and it is up to the decision makers to decide how to react to all the data.

*“Strong role manages play is that they act as the buffer between executives, who are making the decisions with the data, and the workforce, who actually they are goanna communicate with. [...] Now you need managers who also able to interpret the data themselves and take as well as the personal approach, they also have to take an efficiency based approach” OP1*

After all the discussion of changes, it may seem that since there are so many changes ongoing, the old skills are becoming irrelevant, but interviewees hold different opinions



about that. Some interviewees believe that no matter how working method changes, human factors always need to take into consideration, and therefore, communication skills should always be considering relevant and important skill for talents to have.

*“[...] anybody you are hiring for office based environments, you almost always have to have good communication skills and (being a) friendly people [...] you can’t say you will just get rid of all the face-to-face interaction or anything like that ... at the end, it is humans communicate with humans” OP1*

When it comes to the supply to the talent pool, instead of ILM, interviewees tend to be more interesting in the ELM. Interviewees are convinced that with the horizontal value chain developed by industry 4.0, ELM, especially education institutions will be able to react much faster than in nowadays and provide the necessary education and/or development services to external talents to fit the current demand.

*“If the positions are changing [...] it means that the education should also change, the school should prepare the people even more into this kind of positions and give more info.” OP3*

#### 4.5.3. Retention performance – individual (RP-I)

The most frequently mentioned suggestions for the talents to remain competitive and stay employee are stay open-minded and develop proactively. In order to be with the trend, open-minded is the essential quality. Being open-minded means the person is not afraid of change and willing to try new things, which is the start of accepting new working methods and/or business logics industry 4.0 brings to the company. Without opened mind, people will be eventually left behind by the age no matter how many experiences and what skills they used to have. In the meanwhile, it is not enough to just have an opened mind, it is also crucial to proactively reaching for the opportunities to develop yourself with the skills that fit the new trend.

*“I mean if we know that certain trend is up coming, in a way as a person, you should set yourself more open in order to develop yourself further accordingly.”*

OP5

Only when combining the wills (open-mind) and the action (proactively development), talents will be able to create a positive development loop for themselves and stay competitive with all the changes.

*“I’m trying to learn more and more and that's why I want to change the department because I really want to develop myself in a way that if there is a situation, it's not the only reason but also if there is a situation that something happens and I need to be, (if) our department goes down or whatever happens then I am in a good position because I have these experience that I gather.”* OP4

#### 4.5.4. Retention performance – company (RP-C)

First of all, as the one party who holds the decision power and resource in retention activities, interviewees believe that the priority of company is to ensure the efficient communication with respect and trust. As stated in previous sections, without efficient communication, rumors and speculation will rapidly spread within the working environment which easily disturb the daily work of talents and further affects the overall outcome.

*“[...] I always think when you are keeping the communication and you are indicating respect and trust for your Doers, nevertheless you will need to (maybe) resign them and let them go, but still if you are doing that, that is still something needed, and that is something the company need to keep the dignity on that one as well, because in overall they are the source that creating the business and creating the company.”* LM2

Development opportunities is another important resource that interviewees consider company should provide to the talents. These development opportunities can be development courses for specific skills that talents might needed, or it could be open positions for potential talents to take one step forward and create bigger value to the company. It is important for line manager to understand that develop the talents is one of the most important part of their responsibility while them conduct the development discussion with talents and analysis the possible develop path together.

*“That's is something you discuss within your development discussion like what do I (need to do), where are the development path, where are the strengths and where are the weakness, then we need to focus on. [...]. If you take the opposite, so what will happen if you are not being seen or appreciated or given the training or you are not given the opportunity to develop, then [...] you will (naturally) go look for something else and then you will leave that (current company).” LM3*

Another important development direction company should pay attention to is the HR responsibilities. As the respond of negative impression towards current HR function, interviewees consider HR department can and should performance better. In order to do that, the responsibilities of HR department should be developed to fit the current demand from talents and LM. Responsibilities such as assist personal development path and provide a professional suggestion for recruitment will improve both impresses towards HR and the overall outcome of TM.

While the findings are presented with the assistance of study framework, the study will continue with the discussion chapter to further analysis the findings and hope to explain why these findings are discovered by the study base on the existing theories.

To conclude, it seems that the KP is not a general concept in case company but rather as the underlying fact that people realized but can neither clearly define nor determine. Study of KPI should be considered as a future research topic to have a deeper understanding. Both

TPD and RP can be considered providing the positive effect to the talent management outcome in case company, and such outcome is the result of related activities conducted by line managers mostly. HR department is considered function poorly in talent management related issues, the biggest problem of is the lacking of proactive help towards talents and line managers. Though organizing the findings and reveals the pattern behind the findings primarily, this study is able to provide a more detail study framework. See Figure 14 below.

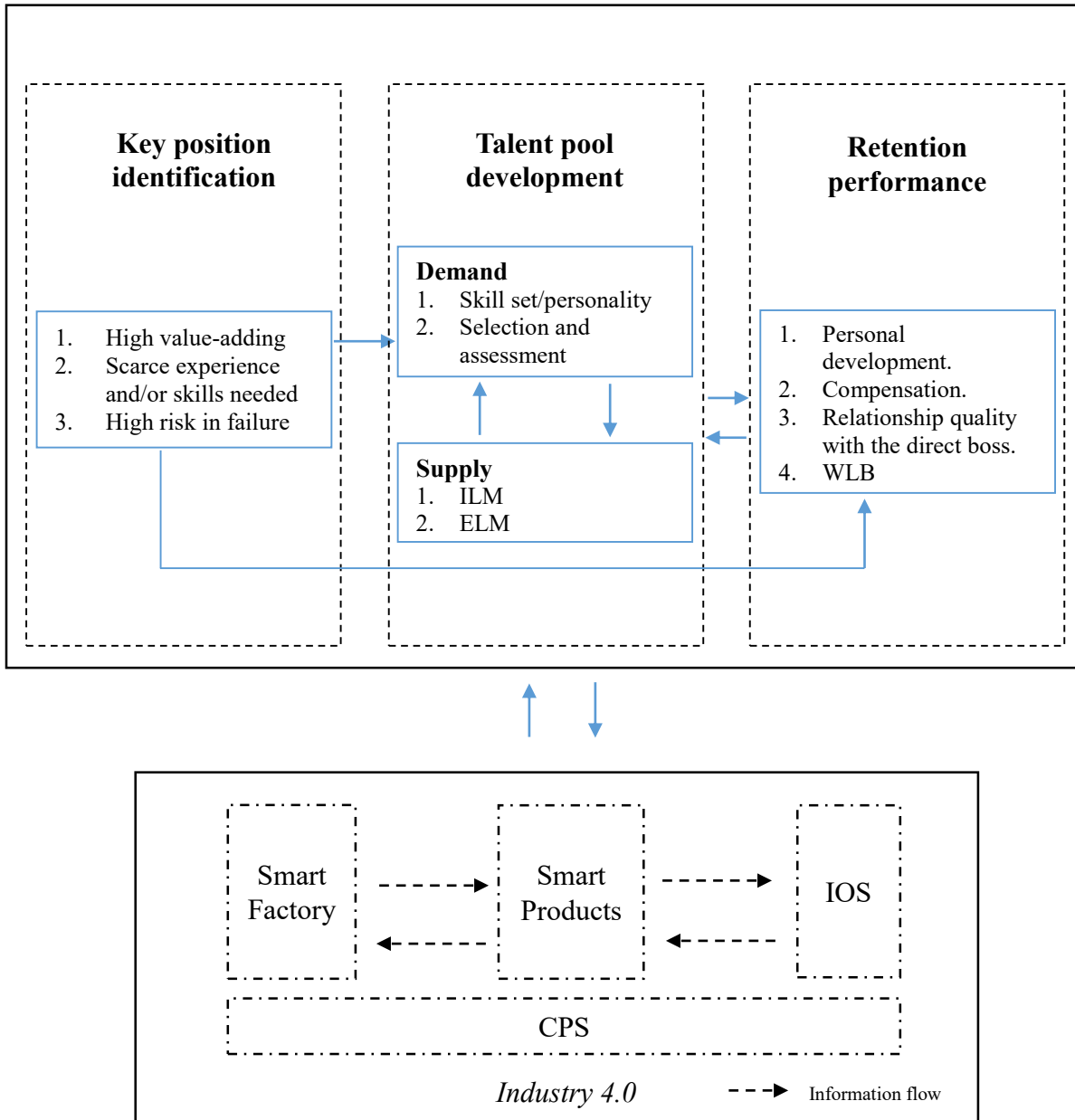


Figure 14. Study framework

## 5. DISCUSSION

As the findings were presented according to the research questions and final study framework were built up, this study will now move to further analysis and discuss the findings to provide a conclusion to the research objects.

The purpose of this study is to identify the possible development process to the new industrial trend 'industry 4.0' and the influence of such trend towards both talent management and the practices of multinational corporations. To provide a better understanding to this research purpose, two research questions were developed: *1) What is the status of talent management in typical technology MNC? 2) How does talent management status influence the 'Industry 4.0' integration of daily tasks within MNC? 3) What are the impacts of industry 4.0 to talent management in MNC?* These questions will be answered within this chapter by linking the findings with study framework and concludes with the supported theories, against theories and new insights that the previous study framework fails to consider.

### 5.1. Current status of talent management in typical technology driven MNC

This study found it clear that the talent management concept is not a common term within the case company, which is a typical technology driven MNC in the manufacturing industry. Both general employees, talents, and line managers are lacking the basic understanding of what are the skills, experience, and characteristics that case company values, not to mention how to obtain such skills, experience and characteristics. This situation is the result of the talent management strategy missing within case company. Due to the managerial culture differences, case company did not clearly state or identify its talent management strategy towards its employees, not to mention identifying key positions, talent pool development status and retention policies.

Although without an official statement, key positions can still be noticed by employees

within the company. In case company, a clear favor of technical skills and experience over than the business-related skills and experience are found by this study, which might be very likely driven by the natural of technological driven MNC. Positions that have more interactions with external stakeholders are also found to have more access to the resources and development opportunities.

Talent pool development is the component that being affected the most by the missing of clear talent management strategy. This study found that due to the clear statement from the company, it is hard to the line managers to understand what kind of talent that company wishes to obtain and how should these talents be approached (if they are from ELM) and develop (if they are within ILM). All recruitment, selection, assessment and other talent pool related activities highly rely on the personal judgement of line managers without the help from HR department, who are usually considered as the core of talent pool development.

Regarding the retention performance, employees and talents found it hard to access personal development opportunities without the direct help from line managers; Line managers also feel the lacking assistance in retention related issues, such as providing personal development suggestions.

Despite the negative impression of HR department, the overall performance of talent management in case company remains positive. Employees believe there are enough chances for them to continue their career path within the company as long as they stay positive and open minded. Line managers are conducting most of the talent management related actions, which might not be clearly stated by the case company, and brought in a good amount of talents while keeping the turnover rate in an acceptable range.

## 5.2. Factors influence the industry 4.0 integration

According to the original study, there are two main factors that talent management was

identified as the main influences towards the integration process of industry 4.0: the quality of talent and the quantity of talent. The missing of clearly stated talent management strategy will most likely result as the inconsistent of talent quality and further influence the industry 4.0 integration. If the liner managers who in charge of recruiting talents for key positions does not know clearly that what skills and experience are needed to accelerate the integration process of industry 4.0, the consistent of talent quality can hardly be expected. In the meanwhile, quantity of talent will also be due to the lacking of clear evaluation about what skills, experience, and characteristics do one employee has to obtain to be recognized as a talent. By which, the appointment process for the key positions will be much longer than it supposes to be and some key positions will be left open. All these negative status of talents will very likely create knowledge barrier to the integration of industry 4.0 and delays the integration process.

Except for the influence of talent management, industry 4.0 will also be affected by other factors within the company. Instead of evaluating the possible integration process by the nature of daily tasks, this study found that people tend to evaluate the process based on the overall benefit and risk that industry 4.0 might do to the company business process, which indirectly reflex the daily process.

In general, this study found that people hold a positive impressing to technology and expectation to the industry 4.0. Regardless the natural of the daily task, the majority of the people believe that the integration of industry 4.0 will be able to further improve the efficiency of case company and enables greater competitive advantage. This positive image of industry 4.0 creates primary positive integration phenomenon for the company to test out the new technology without raising too much resistance from the Doers.

For the actual daily work, the study found that the irresistible changes in daily work are realized by both operators and line managers. Daily routine work, which has a certain standard pattern and much repeated manual input, are expected to have much higher outcome while the input stays the same or even reduce by the assistance of automation. In

the meanwhile, CPS and smart factory enable the ability of further collecting, analyzing and utilizing the raw data, which this study found that people believe will provide strong support to the decision makers and creativity roles to compare possible solutions and select the one with the best outcome. The new level of data utilization is expected to provide more flexible planning (e.g. resource planning, schedule planning, logistic planning) and shorten the reaction period of time-sensitive matters.

This finding highlights the expectation of efficiency improves in the daily routine work and the quality improves in the decision making and unexpected scenario. Although both routine and creative tasks are expected to be supported and obtained better performance by industry 4.0 integration, automation process will be integrated much easier than the data utilization since the automation is already existed in most, if not all, of the manufacturing companies, while data utilization requires much more input and will not be as effective as people expected in a long period. Therefore, the integration of industry 4.0 will very likely to be first integrated into the department with the most daily routine work, and follows by the other units of the company. Same situation goes with the time sensitivity: since the reaction period are crucial to the outcome of certain departments (e.g. logistic), industry 4.0 can be foreseen to have better and earlier integration than in the other departments that less sensitive to the respond time.

Except for the positive expectations, this study also found several factors that have the negative impact towards the integration. Among all the worries, the biggest one is the possible massive lay off that might cause by the further automation. However, people also realized this risk will most likely targeting the positions with daily standard repeated patterns and procedures, while key positions and managers will be granted with even more power and resources than they are having now. Another risk this study found is the possible loss of creativity and loss of motivation due to the nature of daily tasks change. When the machine is providing most of the suggestion and nearly all the information, people are tended to question less to the system but react on the suggestion and information directly. In the long-term, the creativity problem-solving skills of talents might be jeopardized and



become the next ‘bottom pusher’.

Nevertheless, the change of work nature might lead to the loss of motivation due to personal interest. When the business interaction shifts from the interaction of human to integration with machine, talents might start to lose the interest and/or loss the confidence (e.g. because old skills are less relevant in the new business process) which leads them to provide less outcome. This kind of worriedness supports the original assumption of this study that daily interaction methods with affects the industry 4.0 integration process. If the original daily integration of position is already at human-machine phrase (e.g. System maintainer in IT department), a few steps further in that path might not cause too much resistance. However, if the nature of one position in the past is highly related with human-human integration (e.g. Marketing), a higher portion of human-machine communication might very likely raise the alarm of talents and face negative outcome at first.

### 5.3. The future of talent management: the possible impacts from industry 4.0

The study framework had already address three components, which are key position identification (KPI), talent pool development (TPD) and the retention performance (RP), which main determine factors within those components.

#### *Key position identification (KPI)*

KP are essential for the development of one company as the starting stage and one key phase of talent management. (Evans, P., Puick, V., & Björkman, I., 2011) However, this study found surprisingly that in case company, there are neither KPI process nor clear state KPs. This provides a new insight as there clearly is management style difference between the companies from different countries.

High-value adding, high risk in failure and scarce experience and/or skills needed have being considered as three main determine factors of KP. Without the clear stating the

definition, interviewees believe that the KP in case company is those positions that related to technology and/or working with the external stakeholders. Although it is true that technology positions have tighter connections with the overall strategy performance of the company, and the positions that deal with the external stakeholders have higher risk of creating mistakes while such mistakes are harder to fix than them happens internally, they are the sufficient yet not necessary conditions for one position to be KP. For example: IF position A is a key position, we THEN can be sure position A has high risk of failure; but IF position A has high risk in failure, it does NOT necessarily mean position A is key position since it has to also have high value-adding and requires scarce experience and/or skills. Based on such logic, study believes the finding did not support the original study framework and the determine factors of KP should be further study in the future researches.

According to the interview findings, this study can also foresee that KP will receive more resources and opportunities than KP are having at this moment. With the smart factories, the scale of production lines and the number of machines will play less important roles in the future business competition. In order to better survive in the world business, companies will have to provide differential value-adding products/services, which are highly reply on the performance of those positions that provide most of the adding values toward the company.

#### *Talent pool development (TPD)*

As Gallardo-Gallardo et al. (2013) suggested, it is not enough for the companies to identify their key positions and understand how important they are, the company will also need to ensure their accessibility of the talents that fits in these positions. The demand of skills and personal characteristics is considered to be the primarily determine factor of talent pool development for companies. (Swales, S & Blackburn, M., 2015). Most of the responders believe that along with the integration of industry 4.0 and the change of business environment, the future standard of talent would be different from now. Among all the possible changes in standard, the ability of learning, adapting are the new skills responders

believe will be essential to stand out in the upcoming business world, while the data interpret skills are highlighted for decision makers to command. Certain old skills, such as communications skills, remains crucial for talent no matter how standard changes. Selection and assessment are the processes of connecting the potential candidates with actual positions, which are currently considered performance poorly due to the lacking resources and training. There are little highlights from the responders regarding how to solve the current problem. However, there is opinion believes that it should focus on the future development forecasting when selecting the best candidates, instead of evaluating the pass results one have.

Except for the demand of talents, the supply of talents is another important part of talent pool development. Both internal labour market and external labour market provides the talents that company might need, and neither market should be ignoring when developing a health and well function talent pool (Myer, J.P. & Allen, N.J., 1997; Kim, S. & Mclean G.N., 2012). On one hand, in case company, the missing of HR department is a commonly raised problem. Lacking support in developing the talents, lacking assistance when talent move inside the company and the poor quality of communication between HR departments in different subsidiaries will not only reduce the motivation of talents to seek opportunities inside the company but also isolated different units, which further crates barrier of other business development process. On the other hand, the intensive competition for talents in ELM is being realized by some responders in case company. As the reaction towards such competition, case company are suggested to stimulate the ELM and encourage education institution to react on the demand of talent.

#### *Retention performance (RP)*

Suggested by Evans et al. (2011) that all short attention to the personal development will direct result in the poor RP, personal development can be seen as one major influence factor of RP. In case of company, such personal development activities are highly related with the line managers or direct boss of the talent. Therefore, if the management level of one

department can be stabilized while talents able to maintain their relationship, both formal and personal, with their boss, it is expected to provide a better talent development plan for the talents and enhance the RP. As another party in the personal development performance, case company HR was again considered missing from the activities. Some of the talents this study interviews claim they only receive limited amount of assistance, while the majority of talents and line manager considered they received no help, or at least no proactive help, from the HR department in personal development matters.

Along with the integration of industry 4.0, it is important for the talents to stay open-minded and proactively develop themselves in order to obtain keep up with the trend. For the company, ensuring efficient communication and providing enough development opportunities for the talents who are inside the company are the key to having a positive outcome in retention in the fast changing age.

## 6. CONCLUSION

The final chapter of this study aims to surmise the study's contribution to current theories and the managerial implication for companies. It follows by a validity and reliability analysis. The limitation of this research and suggestion for future research will be presented at last.

This study is conducted in order to gain a better understanding of following research questions: 1) *What is the status of talent management in typical technology MNC?* 2) *How does talent management status influence the 'Industry 4.0' integration of daily tasks within MNC?* 3) *What are the impacts of industry 4.0 to talent management in MNC?*

Regarding the first question, this study found that there is no clear stated talent management strategy being implemented within the case company, a typical technology driven MNC. Such missing of strategy might be the reason of managerial culture differences between countries. Due to the lacking of talent management strategy, line managers are conducting most of the talent management related activities (e.g. recruitment) without a clear and consistent vision of what skills, experience, and characteristics that should be considered as talent. The missing of clear strategy also leads to the low satisfaction towards HR department function in assisting talent's personal development and line manager's managerial activities.

For the second question, the factors influence integration process of industry 4.0 within MNC, especially the case company of this study, are variable. From the vision of talent management, it is clear that quality and quantity of talent within one company will create influence towards the industry 4.0 integration process through their knowledge and experience of related technology and business process, skills of communication, planning, implementation and control the integration process. Inconsistent of talent quality and the low talent quantity will both lead to the delay of integration process, resist from talents and employees, and poor performance in test run.

Except for the talent management, the characteristics of tasks and the rely level on real-time information are two primary factors that affect the integration process and order. To be specific, if one task has a clear standard pattern and much repeated manual input, it will be much more likely to be replaced by automation than those tasks with differentials greatly from cases to cases and demand more massive amount of data support. Along with the development of digitalization, daily interaction ways are also facing the changes, which might possibly lead some talents loss of interest when they have to communicate more with the machine rather than with human directly. Such loss of interest might result in the loss of motivation, and even further damage the daily outcome if not spotted and assisted by line managers in time.

The third question concerns the future development of talent management in MNC under the influence of industry 4.0. Start with the key position identification, due to the managerial style differences. The case company did not officially implement any concept regarding key positions not to mention identify those positions. However, there are still favors between the positions in the case company can be found, such favor can be revealed as receiving better development opportunities, more resources and more attention from the top managers. With industry 4.0, these underlying key positions are expected to shift from current favors to the favor of technology-related positions, while being given with even more power, resources, and opportunities. As for the talent pool development, people from the case company believe that when the integration degree of industry 4.0 gets higher, the standards of talent will raise along. In order to keep up the raising speed, it is not enough to keep polishing the traditional core skills such as communication skill, new abilities such as the ability to study, to adapt and to interpret the data are also essential to obtain. Staying side by side with the demand of new talents and supported by the horizontal value chain that industry 4.0 creates, the external labor market is expected to have a faster reaction speed to the new demand of companies and the education institutions are also expected to provide related development opportunities and education programs for these new demands. The final component of talent management is retention performance. When facing not only the integration of industry 4.0 but also other possible changes, it is important for the talents

to stay open-minded and remain the desire to develop themselves proactively. Only by that the talents will be able to, as mention above, have the ability to adapt to new business models. When the talents are looking forward to developing themselves, it is the company's responsibility to provide and inform such opportunities to the talents. This requires not only the work of line managers but also a better performance of HR department.

In conclusion, the integration process and order of industry 4.0 will be affected by the characteristics of tasks, the rely level on real-time information and the way of daily interaction. Key positions in the company are expected to shift, especially towards technology functions, and demand of talents will raise accordingly as well. Retention performance will focus on proving opportunities to talents develop, which requires more help from the HR department.

#### 6.1. Managerial implications

The factors that influence the integration of industry 4.0 seems to be well analyzed and accepted by the people from case company. However, there is not yet one unit (as which has well developed vertical and horizontal value chain) being chosen as the sample department to test the industry 4.0 integration. Such test run might be able to provide a clearer picture to the top manager regarding what are the benefits and negative factors of integrating industry 4.0, what might go wrong and what are the unexpected benefits. Test run unit chosen requires a deeper understanding of the company function and the industry 4,0 develop process in order to avoid interrupting unit's daily function.

Found as surprised, talent management strategy concept is not being implemented within the case company while underlying concepts, such as key positions are being well noticed by the employees. These 'grey areas' might not be the best environment for the company to create positive motivations while people find some key positions getting more opportunities, resources, and attentions from the top manager but no official reason for such favor. Of course, company managerial culture has to be taken into consideration and

introduction of key position concept cannot be rush, but it is still good for the company top managers to keep that in mind and further investigate the possibility of implementation.

In order to raise outcome of the talent pool, a company has to specify the demand and stimulate the supply. By specifying the demand, a company should clearly state several key attitudes that company wishes its employees to have, follows by the skills and/or characteristics that each department wish their employees to obtain. Although there are arguments regarding the diversity of demand remains essential, study believes that some basic attitudes, such as open-minded, are necessary for all the positions within the company. In the meanwhile, the basic skill set for department, such as communication skill for sale department, should be considered as the basic core to the job and do not create any negative effects on the employee diversity.

For the retention performance, and also for all other functions related to the talent management, it is crucial for top managers and HR department to understand the important role that HR paly. To provide the better outcome of talent management, HR department has to have more service attitude and proactively provide more assistance to both talents and line managers and develop themselves according to the need that creates by the integration.

## 6.2. Validity and reliability

In general, the validity of study indicates if the study is actually researching the questions that it claims to research. In semi-structure interviews, validity indicates the ability of researchers to understand the meaning with the verbal language and the underlying nonverbal suggestions, which consist construct validity and external validity. (Yin, 2003) To ensure the construct validity, which refers to the correct use of measures for the target phenomenon, multiple sources of information and secondary data were used. This study did not only take the interview as the only sources of data but also the written company documents and internal presentation materials to ensure the data validity.



The external validity, which indicates if the result can be generalized to other contexts (Yin, 2003), of this study is questionable due to the nature of case study. Due to the case study is limited to one case company, it might be hard for the study to generalized the result and apply into another context. However, even though the generalized level of this study is low, it is supported by the study framework that created on the existing theories, in which case the result can still see as a contribution to other studies in generalization.

Reliability of one study refers to the consistently repeated results that data collection and analysis method lead to. (Yin, 2003) Saunders et al. (2009) believe that the reliability of study can be ensured by the detail explanation of data collection and analysis method, which is exactly what this study conducts at chapter 3.

By implementing the semi-structured interview, this study ensures all the key themes and questions were properly addressed to different interviewees in expecting to receive better reliability in the result. Furthermore, every interview was conducted in English and recorded via different devices, which can listen through repeatedly. By these recording, the study will be able to provide evidence for any possible credibility doubts.

One possible negative factors regarding credibility are the researcher of the study is currently working in the case company, which may unconsciously generate subjective personal opinions while conducting the interview with interviewees. The communication between researcher and interviewees, by the effect of colleague relationship factor, may possibly make the interviewees hold back their true opinions and jeopardize the credibility of this study.

### 6.3. Research limitations

As every other study, this one have several limitations that can be recognized. First, as the nature of case study, the level of generalization of this study will be relatively low compare

with the study that uses other study method.

Secondly, the number of interviewees in this study have are relatively small ( $x=10$ ). These responders are from three different departments that within the same function unit of the case company and the level of these responders are generally in operational level or middle managers, top managers are missing from the data collection section. These factors together might result in a narrower vision towards the study and provides integrated results. However, the aim of this study is to grasp opinions regarding the integration of industry 4.0 but not create a well-structured and generalized theory.

Thirdly, as we mention in the sections above, due to the managerial style differences, there are several determine factors cannot be identifying within the case company. Therefore, when considering the outcome of this study, such special culture context should be taken into consideration.

Moreover, finally, as the nature of the studies that based on the interviews, personal experience, attitudes, characteristics and other personal factors will greatly affect the responds. Key position concepts might be adapted in America office while in Finland it is abandon due to the country culture; interviewees who are interested in technology might give high hope to the future of integration while interviewees who are not interested in technology consider it as another change that they have to suffer with. Such changes might affect the outcome of current study, but the study also argues that due to the lacking of related study, which integrates industry 4.0 with talent management, these 'basis' outcome could also be seen as valuable insight for the future studies.

#### 6.4. Suggestion for future research

This study had filled up several gaps between the industry 4.0 and talent managements. However, there are also a couple of missing areas for the overall talent management and

industry 4.0 theories that this study found valuable to conduct further investigation.

One possible further study can be the what factors affects the implementation of key position concept MNC. As this study mention multiple times, case company did not apply the key position concept (at least not in EU division) but the underlying key positions can still be identified by the employees. What causes the missing of official key positions missing while ‘underlying’ key positions existing could be a valuable study for talent management to be further implement in MNC.

Another possible study is the exacted integration process of industry 4.0. Although this study provides several factors influence the industry 4.0 integration process, it is remaining unclear that in WHAT way and WHAT order industry 4.0 will be implementing into the company. If some future studies can provide basic integration steps of industry 4.0 into MNC and what might be the benefit and cost of each step, top manager will have much better theory support for the integration decisions.

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## APPENDIX

### APPENDIX 1. INTERVIEW QUESTIONS

#### 1. Background

(Discussion about work role, short career history)

#### Part I. Talent Management and Research Case Setting

2. Talent management. What talent management means to you? What are the recent activities involving with talent management? (e.g. key positions<positions that get extra focus>, talent pools<recruitment/selection & identification>, HR structure <retention>)
3. What is the state of talent management in this company? (Note: try to get positive / negative.) (note: discussion should evolve around your thesis literature review topics – what you claim is talent management)
4. Technology introductions. How do you overall feel about technology, how has it affected your job? This company? Recent examples?

#### PART II – Industry 4.0 and Its Implications

*As a new industrial trend, Industry 4.0 can be seen as the 4<sup>th</sup> Industrial revolution, and as we can see from history, such kind of revolution always brings new technology and corporation method to business. I will briefly introduce you this concept and let's make some further discussion*

5. Are you familiar with industry 4.0 concept before? How and what is your opinion on the idea of it?
6. Industry 4.0 impact on your work. How can affect your daily work? (note: again try to get positive / negative)
7. Industry 4.0 in this company. (If you are CEO) What factors will influence the 'Industry 4.0' adoption in this company? (note: positive<e.g. competitive advantage>/negative<e.g. organization change, lay-off, barrier of implementation>)

(note: discussion about current level of digitalization, creativity, dependency on real time

data, dependency on IT etc.)

### **PART III – Industry 4.0 and Talent Management**

8. Let's try to go deeper into the topic and brainstorm a bit: industry 4.0 and Talent management. What impact industry 4.0 could have in talent management? (note: positive<e.g. efficiency of communication/decision making> and negative<e.g. confusion from organization change>)
9. What is needed to overcome the mentioned (reflect to those) negative aspects / challenges personally? <e.g. openness of information, training>
10. What is needed from the company to overcome the challenges / negative aspects?

Anything else to add?

Thank you!

**APPENDIX 2. GENERAL INFORMATION OF THE INTERVIEWEE BACKGROUND**

Subcategories	Codes
Professional experience	Oversea resident experience (4/4) International working experience (4/4) Worked in different departments (10/10)
Experience of current company	Has experienced organization structure change (9/9) Has been working in different positions within this company (7/7) Worked in more than one location within this company (2/2)