Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 6(2):122-129
 (ISSN: 2141-7024)
jetems.scholarlinkresearch.com

Mismatches and Segmented Transformation of Chinese Manufacturing Sector

Kevin Michael Fleary, and Ye Chunming

Business School, University of Shanghai for Science and Technology,
516 Jungong Road Shanghai, P.R. China 200093.

Corresponding Author: Kevin Michael Fleary

Abstract
Chinese manufacturing industry's ability to be both effective (creating value products) and efficient (producing at the lowest cost) depends not only on the management of input factors but also enhancement of processing systems to maximize output. China's labor mismatch and its implication on manufacturing Total Factor Productivity are examined as a means to merit the need for systematic change within manufacturing firms. Systematic change will affect the entire industry performance, particularly vulnerable areas. The significance of understanding that mismatches can be created from not only the employee but employer signals a need for new manufacturing management approaches tailored to post China's Big Industrial Push era. Given the rate of technological advancement of parts of the Chinese manufacturing industry while other segments remain labor intensive producing low value; the contribution of this research identifies a productive gap of underutilize resources necessary to take China into a new competitive stage of development. If left unabated the polarization of the industry will result in suboptimal outcomes on labor, innovation and competition.

Keywords: labor mismatch, transformation, competition, productivity, industrial robots

INTRODUCTION

China's comparative low cost labor is no longer an advantage to attract industrial investment. Arguably this is a facet of China's Lewis Turning Point (Zhang, Yang and Wang 2011) (Wang and Weaver 2013) (Das and N'Diaye 2013). This paper will explore the implication of China's manufacturing labor deficit on productivity. Past research on this issue focused on labor as a unit of total cost in examining the feasibility of China's manufacturing investment where productivity lags increases wages (Sirkin, Zinser and Hohner 2011). Other research dwelled into the changing nature of labor and its implications on worker productivity (Elfstrom and Kuruvilla 2014) including the issue of technology intensities and productivity gaps (Dammert and Ural Marchand 2013). Contrary to contemporary research the problem being address here arises from the position that there is misdiagnosis of cause and effect of productivity pitfalls resulting in a misalignment of labor resources and technological systems.

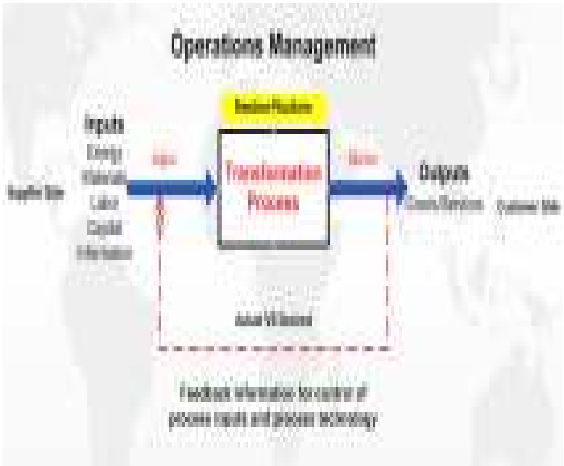
Productivity is measured by the ratio of output to input, and where this is void industry typically faults labor and may even automate as a circumvention measure. This results in productivity gaps given the changing skill of the labor force and China's Big Push Industrial era systems. There needs to be a realignment of labor and productive capacity to realize productive gains. The author adds the view that given China's labor challenge the synthesis of knowledge labor and robotics is best employed to create valued output specifically in the low technology low value added segment of the manufacturing sector. Value added investment will stimulate systematic change as the need for contemporary work processes will be the outcome of such synthesis thereby effectively curbing China's productivity pitfalls and labor mismatches. What is operations management (OM)? Operations Management for Competitive Advantage 11th Edition defines it as: *The design, operation, and improvement of systems that create and deliver the firm's primary products and services.* Control and management of risk in the operations of firm resources is viewed as a critical component for productivity. Why is there such a lack of control and risk within the manufacturing sector? Contemporary researchers in the area of behavioral operations management believe that the contributory cause is the 'people issue'. No longer should operations management approaches be practiced in silos given the challenges faced by the 'people issue' resource which has demonstrated dynamism and therefore unpredictability. To add despite having a population size that makes up over 19% of the world, China is suffering from labor shortages, Wall Street Journal May 1st 2014 article: *"A Billion Strong but Short on Workers"*. It is the view of the author that if this lack of productivity is not effectively managed the acclaim title of manufacturing hub of the world can mislay China. Should China's manufacturing industry continue to produce the same way it has traditionally produced? To answer this question chapter two speaks to mismatch labor theory in a bid to gain insight while identifying a gap in the literature. Chapter three explores the Chinese manufacturing sector via the use of total factor productivity and industry statistics in-order to identify areas for progress. While chapter four incorporates the view of an improved Chinese manufacturing system adjusted to the global competitive environment by the synthesis of knowledge labor and robotics.

LITERATURE REVIEW

The employer's interest, "keep profits high", the employee's interest, "to enjoy a competitive worker's compensation base on their qualification and skill." What the world knows as a fair days work for a fair days pay is somewhat a game of tug of war for China's manufacturing industry stakeholders. The Human Capital Theory (Becker, 1964) (Kessler and Lülfesmann 2006) takes the position that employers value labor productivity and therefore pay high wages to individuals who acquire skills via education. Cetris paribus this definition would apply but if we were to adopt a multidisciplinary approach we would find that this theory falls short in the consideration of the over-supply of college graduates attempting to enter China's labor force. We would also come to realize that the Human Capital Theory puts some degree of wage generation in the control of the employee who seeks to maximize her earning potential by becoming more educated. These graduate cohorts possess degrees and advance degrees but are experiencing difficulty realizing high wages as forwarded by the Human Capital Theory. China Labor Bulletin 22nd June, 2013: *A record number 6.9 million students graduated from college in 2013, up 190,000 from the year before. However, the number of jobs that require a college education fell by around 15 percent in some cities. In Beijing for example, 229,000 students graduated in 2013. But according to data from hiring businesses and organizations, there were only 98,000 jobs available for graduates, 16,000 fewer than in 2012. Commentators dubbed 2013 "the worst year to graduate in history."* On the other hand (Thurow, 1975) (Schlicht 1981) postulates that job characteristics determine wages. To some degree the control of wage generation is removed from the employee and is now in the hands of the employer where education is weighted less. Here we are making the assumption that education is a direct building block for productivity as discussed under the Job-Competition Theory which uses education as an indication of employee training cost. The higher the level of education the lower the cost to train a potential employee and therefore the better that employee chance at employment. The Job-Competition Theory however does not do well in considering the mismatches that occur within China's labor market as hinted to by the extract above. Arguably such mismatches occur due to the speed of reform of China's education system leaving the labor market with an oversupply resulting in an increased unemployment ratio, (Deng, Wang and Liu 2010).

Mismatch is a concept adopted from evolutionary theory that identifies the fact that optimized behavior over time with the introduction of rapid change to environment can result in maladaptive behavior which is suboptimal for survival, (Nesse & Williams, 1994), a definition which will be revisited in later paragraphs. In the *'Mismatch Worker'* of 2007, Kalleberg on the issue of Skill Mismatch Labor Theory puts it well: *mismatches reflect a lack of fit between, on the one hand, individuals' preferences, interests, needs, skills, demographic characteristics, and market power, and, on the other, the required qualifications, physical and mental demands, stability, compensation, benefits, and locations of the jobs they do.* This mismatch is brought about by structural changes within the environment (nation and or firm) or changes to worker related needs (qualified employee expectations). To the best of the author's knowledge base on when this review was done, the literature does not effectively investigate the employer side dynamics which result in mismatches.

Aside from these theoretical views the real crisis is that firms are not able to perform the way they wish to base on their input factors, in this case labor. From an operations management point of view the transformation process is a series of productive activities along a value chain, of which human resource is a supporting activity and typically looked at as the area to justify mismatches. This article however intends to demonstrate that mismatches can also be a result of employer side dynamics not previously explored given the multidisciplinary approach of this paper. The diagram depicts by definition the expected dynamics within such systems. As a result I would like to pose a question: What strategies have employers implemented to adjust the mismatched labor input? An input which has a direct impact on a firm's ability to produce and compete, therefore we will examine how are firms going to adapt to suboptimal labor market conditions as that experience in China?



Source: Adapted by Author.
Illustration of the transformation system from input to output, Adapted by author.

Diagram 1: Basic Operations Management Transformation Process

UNDERSTANDING INDUSTRIALIZED CHINA

Some scholars argue that China's industrialized success, among other, is based on the system known as the Household Registration or Hukou System (K. Chan 2009), a system which documents stratification and therefore allows access to varying degrees of rights within the Chinese economy (Goldstein and Goldstein, 1991) and (Tian, 2003). How can this system be attributed for the success of industrialized China? Simply it facilitated the creation of rural societies typically sustained by agriculture and urban societies typically sustained by commercial activities. China's "Big Push" industrialization strategy is built upon a command economic system of planning and control between rural and urban China. This meticulous control even perfected to present day is considered to be all encompassing given the extent to which government affects society at both micro and macro levels (Chan, 1994; Alexander and Chan, 2004; Naughton, 2007). The Hukou System resulted in inequality in rural and urban China to the degree that rural China was at a disadvantage. China's government was able to capitalize on this disadvantaged given the need for rural families to aspire and the Hukou System was adjusted in support of the 1950s industrial strategy (Chan, 1992; Cheng and Selden, 1994; Wang, 2005) as a means to manage the supply of rural migrant labor. This foresight enabled China to enjoy rapid economic development, given their access to a supply of low cost rural migrant worker (Tang, 1984; Chan, 1994). Over the period 1979 to 2013 under economic reform measures as stated in *China's Economic Rise: History, Trends, Challenges and Implications on U.S.; China's real Gross Domestic Product (GDP) grew at an average annual rate of nearly 10%*. The industrialized economy built upon such worker is characterized by bulk processing systems which required low skill sets given the lack of rights and therefore modest education of the rural migrant worker. Traditionally economists understanding of increasing returns focused primarily on economies of scale where in the long run companies who fully exploited their internal economies realized minimum efficient scale utilizing such techniques as division of labor, specialization and optimization. In such an environment, systems are built to reward common outputs at the product level as well as the worker effort level. A productive system which has been successful given the 30 year positive gross domestic product results as discussed above. The symmetry among dynamics to allow such positive gains are continually being challenged where China is experiencing an inability to maintain productivity gains, *The Economist Intelligence Unit projects that China's real GDP growth will slow considerably averaging 6.3% from 2014 to 2020, and 3.7% from 2021 to 2030*. Despite having the limitation of conceptualizing ideas based on secondary data due to time and language barriers restricting access to primary data. Where clear cut diagnosis would have been develop from examination of China's new generation of employee requirement compare and contrast to the employer's methods of production and requirement to understand where misalignment occurs.

The research was able to provide insight given this limitation, by economic analysis of China's industry statistics taking a closer look at China's manufacturing sector. Given assumptions of the Hicks Neutral Technology model: $Y\left((1)t\right) = A(t) \cdot F[K(t), L(t)]$ reveals that the Total Factor Productivity for the years under investigation 2004-2013 has had fluctuating results with a $\bar{x}$ of 8.42% and σ of 6.35% **Table 1**. Given σ the fluctuations can be attributable to the variety of industrial capital intensities over the period, (**Chart 2**), where investment in areas, for example, automotive, chemical and electric demonstrates technology growth via the use of industrial robotics. During this period the average percentage change on labor was 2.44% and capital 4.25% which indicate that growth in the manufacturing economy has been stimulated by capital investment. The manufacturing GDP is closely aligned to China's overall GDP and signals the importance this sector has on the economy. Adverse to positive productivity gains is the mismatch labor but the position of this paper is that mismatches are being caused by the inability of parts of the industrial sector to adjust (a critical feature within the transformation process) to the contemporary worker found in China today. We are therefore faced with a once successful industrialize export driven system which require a rural migrant worker with accompanying characteristics to be successful but instead are face with a burgeoning young educated worker where only 2.44% increase employment is achieved. Notably there is a lack of experience but this fact is self-reinforcing given the system under discussion and we can expect to see a continued decline in China employment statistics **Chart 1**. With productive systems designed to absorb the traditional rural migrant workers, young educated workers more suited to high value added activities given training will not fit into such systems well and therefore a situation of lack of supply of 'skilled workers' would be the outcome as seen today.

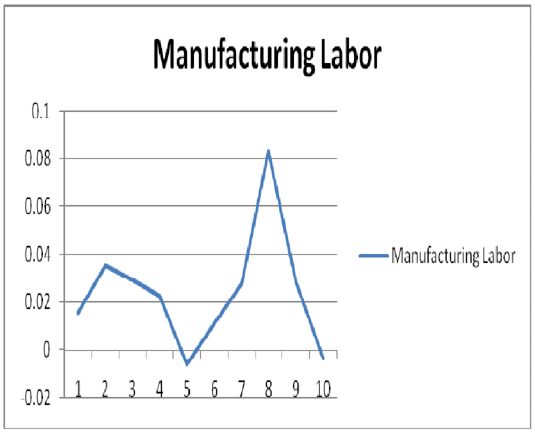


Chart 1 Manufacturing Labor over 10 year period of investigation, own calculations

Table 1: Total Factor Productivity China Manufacturing Industry, 2004-2013.

	$\frac{Y_t - Y_{t-1}}{Y_{t-1}}$	$\frac{K_t - K_{t-1}}{K_{t-1}}$	$\frac{L_t - L_{t-1}}{L_{t-1}}$	TFP_t	Annual % Δ
2004	1.92E-01	1.18E-01	1.58E-02	5.84E-02	5.84%
2005	1.62E-01	3.86E-02	3.52E-02	8.80E-02	8.80%
2006	1.85E-01	3.54E-02	2.94E-02	1.20E-01	11.98%
2007	2.28E-01	5.10E-02	2.27E-02	1.54E-01	15.45%
2008	1.72E-01	5.91E-02	-6.01E-03	1.19E-01	11.92%
2009	7.39E-02	5.32E-02	1.12E-02	9.45E-03	0.94%
2010	1.83E-01	-4.94E-02	2.79E-02	2.05E-01	20.50%
2011	1.56E-01	7.25E-02	8.31E-02	-4.25E-05	0.00%
2012[e]	6.69E-02	2.39E-02	2.85E-02	1.45E-02	1.45%
2013[e]	9.17E-02	2.23E-02	-3.49E-03	7.29E-02	7.29%
	$a = .33$	$1 - a = .67$	MEAN	8.42E-02	8.42%
			STDEV	6.35E-02	6.35%

Source: China National Bureau Statistics/Own Calculations[1].

In China Daily news extract dated 2014/06/24 by Zhao Yinan and Luo Wangshu: *Currently, 29.34 million students study at 13,600 vocational schools and colleges across China. Their average employment rate could reach 90 percent. Ge Daokai, head of the vocational education division of the Ministry of Education, said many Chinese parents and students still prefer ordinary college education over vocational schools - often viewed as a secondary option for students with poor academic records.* This is one such initiative intended to bolsters the supply of skilled labor for China; it is an initiative which will work closely with industry to train labor. Therefore the labor that results from such institution will be equipped to perform specific task at a time that economies are moving towards knowledge and innovation. Whether or not it will do just that will be tested over time but such initiatives affect the economy at a macro level. At the manufacturing level which, among other, contributes to the said mismatch and requires systematic improvements or change towards mitigating labor demand and supply disequilibrium. Contemporary processes need to be implemented that would allow a firm to manage large output of value added products to ensure productivity levels needed to compete internationally. Of course this analogy of the manufacturing sector does not encompass the entire sector within China but instead seeks to identify firms which operate in the low value added labor intensive sector of the industry. Below is a perceptual map which is used to depict the firms in question that contribute to the disequilibrium in China's work force and productivity results:

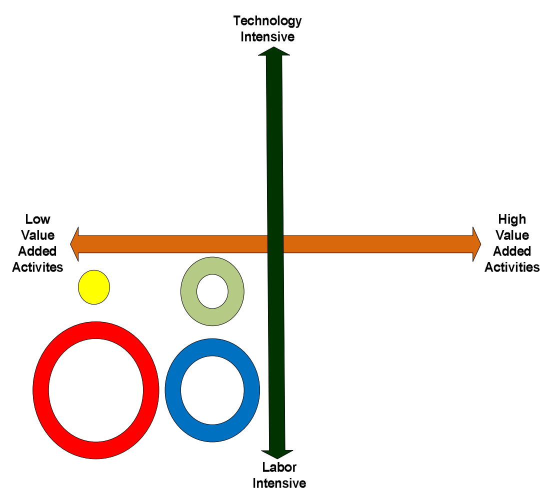


Diagram 2[2]: Perceptual Map of Low Productive Segment.
Source: Adapted by Author.

[1] $TFP_t = \frac{\Delta Y_t}{Y_{(t-1)}} - \alpha(t) \cdot \frac{\Delta K_t}{K_{(t-1)}} - b(t) \cdot \frac{\Delta L_t}{L_{(t-1)}}$, this formula derives from differentiation of log Hicks Neutral Model adjusted for data.

Assumptions under productivity TFP equation:
$a(t) + b(t) = 1$, $Y(t)$ aggregate production/income, $K(t)$ stock of physical capital used in production, $L(t)$ labor inputs in production.

[2] Perceptual map: Illustration of the troubled area within the China manufacturing industry, adapted by author. Map is based on value added and technology.

As a result China manufacturing sector need to diversify their economic portfolio to allow the growth of value added activities within their export driven markets and particularly for their growing internal domestic market. This initiative will go a long way on the firm side to gain positive returns in the continued mismatches found in China's industry. Although the extent of this research does not explore the added economic activity and innovations that can be derive from the employ of knowledge workers creating value added activities (Arthur, 1994) supports the view. Secondly the Resource Base View states that strategy can be viewed as gaining the degree of fit between internal resources and the firm external opportunities (Sloan, 1963; Chandler, 1962; 1977), as a result, what strategy can be engaged towards a fit given the maladaptive behavior of the transformation process? One approach would be to revisit the system processes to examine how it can adapt to labor fluctuations. Firm processes that require speed and accuracy but not without application of knowledgeable ideas.

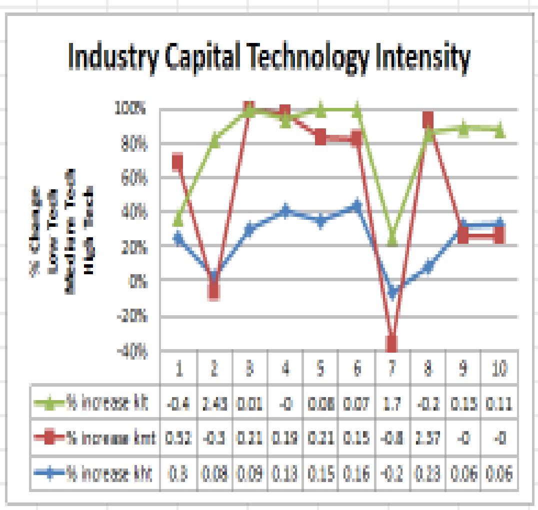
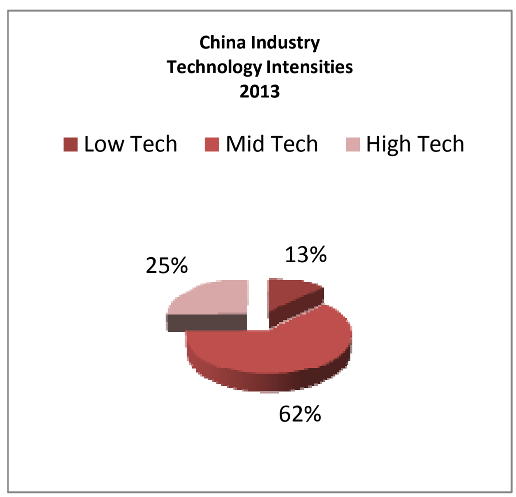


Chart 2: China Manufacturing Industry Capital Technology Intensity.
Source: China National Bureau of Statistics/Own Calculations of technology intensity.[3]

Considering construction and mining, the average industry productivity stands at 10.07%. Sensitivity analysis indicates a 5% increase in low technology capital intensities when labor and GDP is constant will lower productivity by .95% to 9.12%. This is intended to demonstrate the importance of productive labor on GDP. It also speaks to the point that investment in robotics is capital intensive while adds to productivity. Therefore one can achieve an increase manufacturing TFP by investing in low tech areas of manufacturing which can be more cost effective than medium and high tech areas but result in increased GDP manufacturing performance. Regression analysis further supports this claim as Manufacturing GDP in relation to Capital has a smaller R^2 value than labor; 92% and 93% respectively. Given that these percentages are too close to be certain a look at supporting statistics would be able to clarify. Capital has an F-Stat 94.91 and P Value .0000103, Labor F-Stat 110.87 and P-Value .0000058. Overall capital and labor has a correlation of 96% to manufacturing GDP for the period. So our objective is to increase manufacturing GDP by manipulating factors of production for the greatest benefit at the lowest cost. The effect of investing in robotics for the low tech low value areas although capital intensive in nature has a greater impact on labor. As it stands the application of robotic manufacturing within USA is more developed than China, with an average robot density of 71[4] units unlike Asia at 51, but the author would like to argue that this is a positive thing for China given that their industry has spare capacity to invest in robotics. **Diagram 5** indicates that China intends to do just that however typical investment attitude will follow that displayed in **Diagram 4** which should be more diverse, targeted to low tech low value added areas to significantly increase manufacturing GDP at the lowest investment cost. Arguably the statistics show an average increase in low tech areas for the period as 39.24% higher than middle and high tech 25.525% and 10.82% respectively. However this increase fluctuates and we can see the effects of financial crisis on the result which represents an increase in automation while the author purports systematic transformation.



Source: China National Bureau of Statistics, Own Calculation.

[3] China industrial production statistics sorted base on International Standard Industrial Classification. The diagram illustrates the need for more investment in low tech low value areas.

[4] World Robotics 2014 Executive Summary

OPERATIONS MANAGEMENT TRANSFORMATIONAL ADJUSTMENTS

Foxconn's Liu Ku said: "*Nowadays, young workers are picky about their workplaces, and it's become difficult for us to find workers*." High labor cost have resulted in companies exploring the advantages of using robotics as a way to reduce cost while optimizing precision with less wasted resources simultaneously creating quality customizable goods in short periods of time with options for long production runs. The possibility for innovation would be increased when companies maintain a cadre of competent workers who are able to drive manufacturing competitiveness. To ensure that the best workers are not demotivated as changes to the manufacturing process become more automated researchers have forwarded the view of responsible structuring to avoid adverse effects on worker performance (Rigby, 2000), (The Casio Study, 2002).

This view sees an employee as assets not costs, allowing for the development of selected human resources. As companies transform their systems, human labor is being characterized by highly skilled and qualified workers. It is proposed that robots will be best used to perform dangerous and routine jobs along production runs similar to assembly lines like the "foxbot" developed by Foxconn. To compensate for the rigidity of robotics, adaptive and modular approaches in design and development coupled with technology allows for safe easily programmable user-friendly stand-alone robots, for example "baxter" developed by rethink robotics. "baxter" is one of the first robots developed to work safely alongside humans due to its ability to sense its environment. Therefore robotics will continue to affect varying parts of the manufacturing value chains, changing the way processes and systems are developed and managed. The question of whether robots are better at manufacturing arises, will robots replace human labor? To begin to answer this question management must factor the human advantages and disadvantages compared to that of the robot. Human beings are tooled with one of the most advance complex adaptive system, the brain, and feed this system with information from their environment to perform task in the workplace. This allows humans the ability to conduct technical work and make adhoc decisions. Robotics on the other hand which has thus far successfully automated various versions of the human arm, cannot process information like a human. Despite this robots can learn by mimicry and other new age sensory devices, performing repeatable task over long periods of time to exact inputted specification, (Larizza and Petrone 2010). Calibration of robotics today can be conducted with a wrench or via programmable software technologies. This is a feature which is becoming the norm as companies within the manufacturing sector develop computer integrated manufacturing platforms, as a means to derive greater control on manufacturing performance, (Taghizadeh, Najafi, and Ghaffari 2010) and productivity amidst encroaching competition. Research and implementation of robotics is but in its initiation to growth stage of its life cycle for China and the possibilities for progress within the manufacturing sector is huge, this area warrants future research. The prime issue in justifying a robot is labor displacement. A single robot can operate for more than one shift and thereby multiply the labor saving potential, (Engelberger 1980). Innovation is brought about by highly skilled workers who benefit from cross learning due to the employment of computer integrated manufacturing approaches to production for example.

Therefore critics of robotics need to appreciate the dynamism of human labor and the need to gain high value outputs by a change in the labor portfolio within China's manufacturing sector. In understanding the progresses in management regarding labor the hope is that the Lewis' Turning point and its effects can be avoided or even delayed as China continues to enjoy the competitive advantage of low cost manufacturing labor. Robotics has penetrated the manufacturing industry for some time now globally, **Diagram 5**, and has demonstrated its ability to contribute to improve operations. A company that is desirous of staying competitive in the manufacturing industry today has to consider and begin to implement robotics to survive. The new focus for firms therefore should not be on trying to adjust human labor, which will continue to be a feat that the Chinese government will manage, but in trying to find ways to adjust robotics to gain cost advantages. One such way would be to invest in research and development of robotics in order to become the known and respected producer and employer of manufacturing robotics world over. It is recommended to approach this at the industry level thereby allowing small Chinese firms the ability to transition at the smallest possible cost. What will happen when competitors transform their processes in a similar way? Simply, China cannot stop this progression and this may be a good area for future research; but it can lead it, facilitate its worldwide development and continually find ways to remain a market leader in this regard.

The manufacturing industry which develops this approach to the management of labor will gain productively and ultimately receive the title of manufacturing hub of the world whether or not the market is domestic or international. **Diagram 4** illustrates the concentration and lack thereof robotic use in industry; this signals an opportunity to diversify the robotic portfolio to areas not traditionally targeted. Areas identified in **Diagram 2** which are deprived of human labor given changing characteristics of employees today.

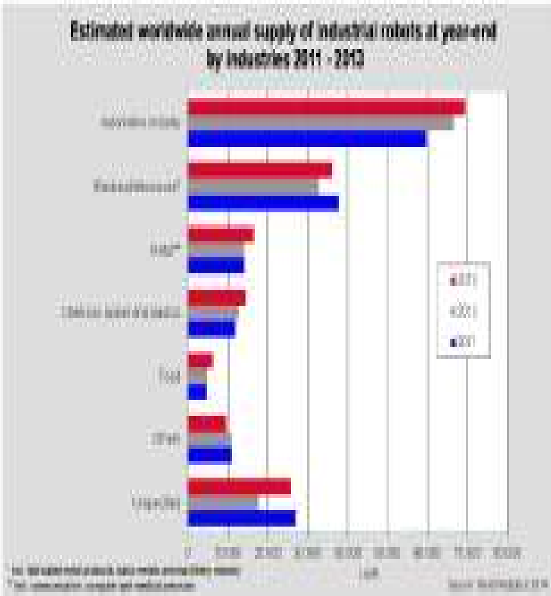


Diagram 4[5]**:** Estimated worldwide annual supply of industrial robots, 2011-2013.
Source: World Robotics 2014.

The International Federation of Robotics estimates that by 2017 China will be the largest market for industrial robots, how and where these robots would be utilized is the question that can determine which country optimizes their investment to become a manufacturing leader.

Diagram 4 and **5** speaks to the increase interest and change in operations management approaches within the industrialized world. It should be noted that this interest is concentrated in key areas and the United States of America (USA) is leading the charge with the largest amount of operational robots. China is not far behind and is estimated will obtain the largest stock ceteris paribus. Meanwhile the robot market leader is implementing contemporary techniques to optimize their competitive edge, given its economic importance. Smart Manufacturing brings together knowledge workers and robotics. The search for the new competitive edge within the manufacturing industry is here and the economy that is able to gain symmetry among the input factors of human and robotic labor will be the one to increase value added output and their GDP.

Country	2012	2013	2014*	2017*
America	**28,137**	**30,317**	**33,700**	**40,000**
Brazil	1,645	1,266	2,000	3,500
North America (Canada, Mexico, USA)	26,269	28,668	31,500	36,000
Other America	223	251	200	500
Asia/Australia	**84,645**	**98,807**	**120,000**	**186,000**
China	22,987	36,560	50,000	100,000
India	1,508	1,917	2,500	5,000
Japan	28,680	25,110	28,000	32,000
Republic of Korea	19,424	21,307	23,500	26,000
Taiwan	3,368	5,457	6,000	9,000
Thailand	4,028	3,221	4,200	7,000
other Asia/Australia	4,650	5,235	5,800	7,000
Europe	**41,218**	**43,284**	**46,000**	**55,000**
Czech Rep.	1,040	1,337	1,800	2,600
France	2,956	2,161	2,300	2,800
Germany	17,528	18,297	19,500	21,000
Italy	4,402	4,701	4,800	5,500
Spain	2,005	2,764	3,000	3,800
United Kingdom	2,943	2,486	2,500	3,500
other Europe	10,344	11,538	12,100	15,800
Africa	**393**	**733**	**800**	**1,000**
not specified by countries**	4,953	4,991	4,500	6,000
Total	**159,346**	**178,132**	**205,000**	**288,000**

Sources: IFR, national robot associations
*forecast
** reported and estimated sales which could not be specified by countries

Diagram 5 Robotic Sale by region[6].

CONCLUSION

In closing the survival of China's manufacturing industry will be based on China's ability to out compete its competitors with the synthesis of robot and human interaction to create value added products. If China intends to remain with the acclaim title "Manufacturing Hub of the World", changes in its productive capacity must be implemented by bringing an increase degree of reliability to the production process. The author sort to identify that mismatches between the education system and labor industry, particularly manufacturing, exist. Labor fluctuations within the manufacturing sector contribute adversely to the level of productivity realized averaging 8.42%, due to the decreasing employment statistic with mean 2.44% over the 10 year period of research. In addition mismatches also derive from firm side deficiencies due to suboptimal production processes developed primarily under China's Big Industrial Push era. Processes that are best situated for the traditional rural migrant worker and less so to the young educated graduate found today in China that can facilitate a new manufacturing era. If left unaided over time inadequate productivity levels will bring into question the title of manufacturing hub of the world that China now possess, given the aspirations of manufacturing industries in competing countries: the United States of America (28668 2013 Robot Sales), Germany (18297 2013 Robot Sales) and Japan (25110 2013 Robot Sales) for example. As a result to improve the OM transformation process,

[5] Source: International Federation of Robotics. http://data.worldbank.org/indicator/NV.SRV.TETC.ZS
Source: http://data.worldbank.org/indicator/NV.SRV.TETC.ZS
http://www.ifr.org/industrial-robots/statistics/

[6] Source: http://www.worldrobotics.org/uploads/media/Executive_Summary_WR_2014.pdf

adjustments must be made to the management of labor. In the United States of America industry has implemented contemporary techniques like Smart Manufacturing. China's manufacturing industry, particularly firms that operate in the labor intensive low value added zones which at 2013 occupied 13.14% of the industrial sector, must aggressively implement robotics. In the game of manufacturing chess its China's move now to find ways to improve productivity (output/input) and this paper argues that investment in low value added low tech areas is effective given opportunity, labor and cost advantages. It is important to note that this area is becoming less attractive as an area to work in as people are gravitating more to service jobs which contributes 46% to GDP[7]. For China's manufacturing sector to be successful the implementation of robotics requires a change in processes and the way in which human talent is utilized. Human talent would now be invested into value added activities creating innovations to target the growing internal domestic market. The future of knowledge workers is bright, more and more people are moving away from physical labor and moving into mental labor. The sooner we acknowledge this fact the sooner we can begin to put mechanism in place to effectively manage this transition and continue the development of the Chinese economy via a progressive manufacturing industry equip to lead the knowledge labor robotic movement.

REFERENCES

Bi, Z M, Y Lin, and W J Zhang. "The general architecture of adaptive robotic systems for manufacturing applications." *Robotics and Computer Integrated Manufacturing* 26, no. 5 (2010): 461-470.

Chan, Jenny , and Ngai Pun. "Suicide as Protest for the New Generation of Chinese Migrant Workers: Foxconn, Global Capital, and the State." *The Asia-Pacific Journal* 37 (2010): 2-10.

Chan, Kam Wing . "The Chinese Hukou System at 50." *Eurasian Geography and Economics* 50, no. 2 (2009): 197-221.

Dammert, Ana, and Beyza Ural Marchand. "Privatization in China: Technology and Gender in the Manufacturing Sector." *Journal of Economic Literature*, 2013: 1-32.

Das, Mitali , and Papa N'Diaye. "Chronicle of a Decline Foretold: Has China Reached the Lewis Turning Point?" *International Monetary Fund* IMF Working Paper, no. 13/26 (2013): 3-17.

Deng, Q Q, Q Wang, and N C Liu . "National Initiatives for Building World Class Universities: Comparisons between Asian and European experience." *Higher Education Forum* 7 (2010): 35-51.

Elfstrom, Manfred , and Sarosh Kuruvilla . "The Changing Nature of Labor Unrest in China." *Industrial and Labor Relations Review* 67, no. 2 (2014): 453-480.

Engelberger, Joseph F. "Robotics In Practice." *Cambridge Journals*, 1980: 169.

Kalleberg, Arne L. "The Mismatch Worker: When people don't fit their jobs." *Industrial and Labor Relations Review* 22, no. 1 (2008): 24-40.

Liu, K, and K Daly. "Foreign Direct Investment in China Manufacturing Industry—Transformation from a Low Tech to High Tech Manufacturing." *International Journal of Business and Management* 6, no. 7 (2011): 15-27.

Reeves, M, and M Deimler. "Adaptability: The New Competitive Advantage." *Harvard Business Review* 89, no. 8 (2011): 134-141.

Schlicht , Ekkehart. "Training Costs and Wage Differentials in the Theory of Job Competition." *Journal of Institutional and Theoretical Economics* 2, no. 137 (1981): 212-221.

Sirkin, Harold, Michael Zinser, and Douglas Hohner. *Made In America Again. Why manufacturing will return to the U.S.* Comparative, Beijing: The Boston Consulting Group, 2011.

Wang, Xiaobing, and Nick Weaver. "Surplus labour and Lewis turning points in China." *Journal of Chinese Economic and Business Studies* 11, no. 1 (2013): 1-12.

Zhang, Xiaobo, Jin Yang, and Shenglin Wang. "China has reached the Lewis turning point." *China Economic Review Elsevier* 22, no. 4 (2011): 542-554.

[7] Source: http://data.worldbank.org/indicator/NV.SRV.TETC.ZS