



Synergetic Effect Mechanism of Knowledge Work Productivity- An Empirical Study Based on Coaching Techniques

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Abstract. In sharing knowledge economy era, technological innovation brings the change of production pattern, focus on the process structure of knowledge work productivity, value creation and collaborative innovation to provide new technology paradigm and technical path of knowledge work productivity improvement. This paper discusses the input-output process of knowledge work productivity and its influence mechanism through the theoretical research and empirical analysis on coaching techniques. These results include that: the productivity effect positively affects the profit effect; learning ability, learning curve, learning experience, intellectual capital, organizational culture moderate the relationship between individual productivity and team productivity. The influencing factors of knowledge work productivity are related to the level of knowledge work productivity. Knowledge workers' skills, positive emotions, work practices, organizational change, knowledge management, incentive policy, social environment, knowledge sharing, knowledge creation, knowledge utilization and collaborative network are positively correlated with knowledge work productivity. These theories verifications broaden the thought for the study of knowledge work productivity and determine the directions for the improvement of knowledge work productivity.

Keywords: Knowledge work productivity; Input-output; Knowledge sharing; Knowledge creation; Collaborative network

1 Introduction

Manyika, et. al. (2011) proposed that as long as the right policies and strong support are implemented, big data will become the key foundation for competitive advantage and become a new wave underpinning productivity growth, innovation and consumer surplus. Studies have found that big data creates huge value for the global economy, improves company productivity and competitive advantage, and creates a large amount of economic surplus for consumers [1]. For the U.S. economy to recover, it is more important than ever to solve the productivity mystery. The growth of GDP in the United

States mainly depends on the improvement of productivity. The notion that there is a trade-off between productivity and employment in a dynamic economy is incorrect, with simultaneous growth in productivity and employment more than two-thirds of the time since 1929. Productivity growth can come from an increase in efficiency, or an increase in the quantity and value of output for a given input. Productivity gains are critical to the overall health and wealth of the U.S. economy, as well as U.S. competitiveness globally (Malhotra et al. 2011) [2].

2 Research Theoretical Hypotheses

2.1 Productivity effect and profit effect

Färe, et al. (2019) constructed a framework to study firm efficiency behavior, in which the profit efficiency measure satisfies the desired property and incorporates the traditional Farrell measure with technical efficiency and allocative efficiency as multiplicative functions. Using a dual-input-dual-output production technology assumption, a numerical description is carried out, and three possible improvement models are derived: using output-oriented reforms with unchanged inputs; by changing input mix and input scale; adopting output-oriented and input-oriented reforms to eliminate all factors of profit inefficiency [3].

From the above discussion, it is found that there is a close relationship between productivity and profit. Productivity is an important aspect of profit effect. Increasing productivity can improve corporate profits. Improving the production technology structure and input-output mode of productivity can promote the generation of profit effects and realize profits. Optimum configuration for efficiency. Therefore, this paper puts forward theoretical hypothesis 1: There is a positive correlation between productivity and profit, and the productivity effect positively affects the profit effect.

2.2 Individual productivity and team productivity

Ramezan (2012) constructed a validated model for measuring knowledge productivity in knowledge-intensive organizations. Knowledge productivity involves the ways in individuals, teams and units within an organization. The ability to learn can create organizational knowledge outcomes or innovations. Individual learning improves knowledge productivity by influencing human capital, group learning improves knowledge productivity by influencing social capital, and organizational learning improves knowledge productivity by influencing structural capital [4].

From the above theoretical analysis, it is found that individual productivity and team productivity can be decomposed, individual productivity can promote or inhibit team productivity, and team productivity also has a certain impact on individual productivity. The interaction of team members positively regulates the productivity of knowledge workers, and the team incentive effect positively affects the productivity of knowledge workers. Individual learning, team learning, intellectual capital, organizational culture, and organizational structure have a moderating relationship on individual productivity and team productivity. Therefore, this paper proposes theoretical research hypothesis

2: Individual productivity is correlated with team productivity. Hypothesis 2a: Individual productivity promotes or inhibits team productivity; Hypothesis 2b: Positive team behavior positively affects individual productivity; Hypothesis 2c: Learning ability, learning curve, learning experience, intellectual capital, organizational culture moderate relationship between individual productivity and team productivity.

2.3 Influencing factors of knowledge work productivity

Palvalin (2019) pointed out that the influencing factors of productivity can be used to improve the productivity of knowledge work. If the scarce resources of organizational development are used to increase intangible assets, namely management and work practices, productivity will be maximized. Knowledge workers have the greatest impact on knowledge work productivity. Employee well-being has the greatest positive correlation with job productivity, followed by personal work practices; the third most important factor is social environment [5]. Fauzi, et al. (2019) integrated the comprehensive determinants of academic knowledge sharing behaviors, dividing them into personal, organizational, and technological factors. When the academic knowledge sharing behavior is enhanced, the scientific research output of colleges and universities can be further improved. Emphasize that research output is expressed through the productivity of academic research. After understanding what factors can contribute to knowledge sharing, management department can focus on how to improve the academic productivity of higher education institutions [6].

From the above theoretical analysis, it can be found that there are many factors affecting the productivity of knowledge work. By understanding the factors affecting the productivity of knowledge work, we can understand the path of improving the productivity of knowledge work. Knowledge workers have the greatest impact on knowledge work productivity. Personal aspects of knowledge workers, knowledge work stress management and intervention, organizational aspects of work-related issues, organizational design aspects such as job strategy, human resource management, structures, reward systems, business processes and their linkages form a fundamental part of knowledge work productivity. Factors related to work activities, management factors, organizational factors, and incentive social factors have a great impact on productivity. Knowledge sharing behavior, knowledge management, knowledge creation and knowledge utilization can significantly improve the work efficiency of knowledge workers. In addition, school-enterprise cooperation can promote specialization, increase academic output, and increase the academic productivity of knowledge workers. Therefore, this paper puts forward theoretical hypothesis 3: the influencing factors of knowledge work productivity are related to knowledge work productivity; Hypothesis 3a: knowledge workers' knowledge skills, positive emotions, work practices and work productivity are significantly positively correlated; Hypothesis 3b: organizational change, knowledge management, Incentive policies are significantly related to knowledge work productivity; Hypothesis 3c: Social environment is significantly related to knowledge work productivity; Hypothesis 3d: Knowledge sharing, knowledge creation and knowledge utilization are positively related to knowledge work

productivity; Hypothesis 3e: School-enterprise cooperation and knowledge work productivity are positively related.

2.4 Collaborative networks and productivity

Michaelis, et al. (2015) constructed a theoretical model of the impact of high-performance work systems and worker productivity based on knowledge management companies. Through empirical research, it was shown that when middle and senior management implement effective knowledge management, the knowledge communication and integration of employees will affect employee' productivity[7]. From the above analysis, it is shown that relational coordination enables employees to coordinate their work with each other more effectively, thereby pushing the production possibility frontier to achieve higher quality results. When middle and high-level executives implement effective knowledge management, the knowledge communication and integration of employees plays an important role in regulating the impact of employee productivity, but the acquisition of heterogeneous knowledge is particularly important for management performance and innovation performance. The impact of social connection or network closure on knowledge worker performance depends on the primary role that worker and communication partner play in the relationship affected by this closure. The link between network structure and performance is mainly influenced by structural hole theory. This paper proposes theoretical hypothesis 4: Collaborative network positively affects knowledge work productivity, Hypothesis 4a: Heterogeneous knowledge plays a moderating role between knowledge collaboration network and knowledge work productivity, Hypothesis 4b: Knowledge worker roles play a role in knowledge collaboration network and knowledge work productivity regulates between them.

3 Research Methods

3.1 Grounded Theory Approach

This paper adopts the semi-structured interview method of grounded theory method and topic mode for analysis. Wiesche, et al. (2017) concluded that grounded theory approaches are designed to enable the discovery of inductive theory, while developing such a theory on the basis of empirical observations or data [8]. Exploratory semi-structured interviews explore a specific organizational issue from various perspectives. The interviewer designs a series of questions around a specific topic in order to collect data (Castle, 2018) [9].

3.2 Research sample

Dai Changjun et al. (2006) regard the procedural and normative nature of work as a criterion for judging whether it is knowledge work: any work whose process and content have not yet reached a clear procedural and standardization level should be classified as knowledge work. That is, knowledge work is a kind of non-programmed and

non-standardized work [10]. A big part of a coaching job is helping people experiment with new behaviors, test different strategies, and then practice and refine those effective methods (Boyatzis et al. 2019) [11]. According to the above theoretical analysis, coaching culture is gradually becoming an important part of corporate culture. Coaching technical work is highly valued in many well-known companies. Coaching technical work belongs to the category of knowledge work, and driving school coaching technical work is universal in empirical research, has good reliability and validity, so this paper selects the driving school coach work as the research sample, adopts the grounded theory method to analyze the content, and provides a reliable method for solving the problem of knowledge work productivity. During the interview and research process, semi-structured interviews were conducted with three driving school coaches and fifteen driving school students respectively, and the interview time was about half an hour. The three coaches were rated as excellent in special training ability, innovation ability, management ability, collaboration ability, etc. Fifteen driving school students showed positive and focused learning attitude in the learning process.

3.3 Encoding results

This paper conducts in-depth interviews with three driving school coaches and focus interviews with 15 driving school students, and analyzes the content of the original data. According to the grounded theory, the data is coded and conceptualized. After open login, the research results are shown in the table. 1-4. See Table 1 for the coding of the original data of Coach A01, Table 2 for the coding of the original data of Coach A02, Table 3 for the coding of the original data of Coach A03, and Table 4-6 for the coding of the original data of the 15 driving school students.

Table 1. Coding of original data of coach A01

Coding of original data of coach A01	open decoding (conceptualization)
I hope that I have pupils everywhere (A0101).	motivation, job skills, career development
I think I'm a serious and responsible coach (A0102).	work attitude, work spirit
This standard is hard to say, teach students in accordance with their aptitude, first of all, they must have proficient driving skills, unique ability to explain, have patience and a good temper (A0103).	work ability, work attitude, work method, attention, personal quality
The driving school assessment is mainly based on the basic quality of the coach, safe production, and pass rate. The first is the enthusiasm for the job. In addition to the source of students and profits, the most important thing is the reputation and qualifications of the coach (A0104).	personal quality, work enthusiasm, pass rate, good reputation, seniority, profit margin
Friends, relatives, most of whom are introduced by trainees (A0105).	social network
The evaluation of my students is very important, which is directly related to my survival as a coach. A coach with a bad reputation will be fired by the boss (A0106).	job evaluation, good reputation
The coach must have a good explanation ability. I teach students according to their aptitude. Only when the students understand and find the method, will they make progress. The input of coaching work includes labor, capital, knowledge, and experience. The output can be measured by the pass rate of students. Good reputation is measured by students and accumulated by coaches. (A0107).	working methods, labor, capital, knowledge, experience, student pass rate, good reputation
A combination of physical and mental work. The job is very difficult. (A0108).	physical work, mental work
Student Source, profit. The most important thing is safety (A0109).	source, profit
Every student passed the exam, I felt gratified, proud and happy (A0110).	happiness at work

Through open login, axis login, and selective login, the main category of synergistic effect of knowledge work productivity is refined, and the measurement categories of coach version and student version are obtained respectively. The research results are shown in Table 7-8.

Table 7 is the refined coding of the main categories of knowledge work productivity synergies in the coaching version. According to grounded theory, research and analysis show that the knowledge work productivity synergy categories include mental model, emotional model, self-efficacy, career, social network, work engagement, work Output, the main categories include knowledge workers cognitive ability, social support, knowledge work productivity representation dimensions.

Table 2. Coding of original data of coach A02

Coding of original data of coach A02	open decoding (conceptualization)
When I learned to drive, I felt that I liked this job very much, and I also wanted to pass on my driving experience and experience (A0201).	motivation
Successful (A0202).	work achievement
Good communication skills, precise language skills, gentle personality, and patient explanation (A0203).	work communication skills, character, will quality
How many students are recruited in one year. Pass rate for subjects II and III (A0204).	origin, pass rate
It is mainly based on the recommendation of students, good friends, and classmates' introduction (A0205).	social network
Very important, try to make everyone happy to graduate (A0206).	job satisfaction
High, reasonable and safe driving time, considering for students (A0207).	time, understanding
Combine the two (A0208).	physical work, mental work
The price confusion caused by the oversupply in the market makes many students only focus on price and not on service attitude and quality when they are just starting out (A0209).	price issues, service attitude, work quality
It's alright, I'm happy to see the joy of the students every time they pass the certificate and their thanks to us (A0210).	happiness at work

Table 3. Coding of original data of coach A03

Coding of original data of coach A03	open decoding (conceptualization)
Interests, Livelihood (A0301).	motivation
Successful, hardworking, good to students, strict, demanding, caring for students (A0302).	work attitude, attention
Good physical fitness, theoretical knowledge, and practical knowledge (A0303).	personal qualities, job skills
Technical competitions, traffic accident rescue performances, working with licenses, strict discipline, work input requires energy, interest, driving school platform, the output includes driving license skills, coach certificate (A0304).	work skills, work discipline, work incentives, work motivation, platform construction, work engagement
Introduced by a friend (A0305).	social network
Important, Admissions (A0306).	job evaluation, enrollment
High, seven or eight students a day (A0307).	number of students
How to watch point, wash the car, lift the car (A0308).	physical work, mental work
Concentrate to teach students (A0309).	mental work
Yes, chat with students (A0310).	happiness at work

Table 8 is the refined code of the main categories of knowledge work productivity synergies in the student version. According to the grounded theory, the research and analysis show that the knowledge work productivity synergy categories include mental models, self-efficacy, organizational resources, cost theory, process theory, and work output. The main categories include cognitive ability of knowledge workers, organizational support, efficiency and effectiveness.

Table 4. Original data codes of A04-08 driving school students

interviewees	original data	open decoding
A04	Reliable, price is not expensive (A0401). Good, mainly in terms of teaching, the teaching is still in place, and the final skills teaching results are good. (A0402). The school's admissions process needs to be improved (A0403). expectations were not high (A0404). The initial stage is mental and physical strength, the later stage is manual labor (A0405). Take it, 2-3 months, I can't remember exactly (A0406).	reputation, price working ability admissions process learning process physical work, mental work study-time
A05	Cost-effective, good service attitude (A0501) Good, price, service (A0502) Patience (A0503) more pleasant (A0504) Mental Work (A0505) I got my driver's license and studied for nearly 3 months. (A0506)	price, quality, service attitude price, service will quality learning mood mental work study-time
A06	close to home (A0601) Excellent (A0602) Can be a little more patient (A0603) Fairly pleasant (A0604) Need both brain and physical strength (A0605) 3 months (A0606)	learning distance service attitude will quality learning mood physical work, mental work study-time
A07	Fees and coaching qualities (A0701) Good (A0702) Temper (A0703) Happy (A0704) Physical strength (A0705) Half a year (A0706)	price, quality service attitude character learning mood manual labor study-time
A08	The coach is serious and responsible (A0801) Qualified, responsible (A0802) Responsible (A0803) Yes (A0804) Both (A0805) Got it, two months (A0806)	coach's work attitude teaching attitude will quality learning mood physical work, mental work study-time

Table 5. Original data codes of A09-13 driving school students

interviewees	original data	open decoding
A09	Attentive service (A0901) Good, understand students, considerate for students sometimes pick up and drop off (A0902) Point out more technical problems (A0903) Happy (A0904) Mental work (A0905) One and a half years (A0906)	work attitude attention working ability learning mood mental work study-time
A10	Driving school reputation and recommendations from people around (A1001) Good (A1002) Patience (A1003) Pleasant, more people in one car (A1004) Brain power, special concentration of energy (A1005) Two months (A1006)	reputation service attitude will quality learning mood mental work study-time
A11	It is convenient to practice driving, and the level of the coach is high (A1101) Qualified, the method is not easy (A1102) Be patient (A1103) Fairly pleasant (A1104) Both physical and mental work (A1105) Got a driver's license. One year. (A1106)	learning distance, job skills teaching method will quality learning mood physical work, mental work study-time
A12	Introduction of acquaintances (A1201) Excellent (A1202) Mandarin (A1203) Stressful learning process (A1204) Mental Work (A1205) I got it, the study time is two months (A1206)	social network service attitude language skills learning mood mental work study-time
A13	Price and distance (A1301) Pass (A1302) Road Driving Experience (A1303) Yes (A1304)	price, distance service attitude working ability learning mood

Both (A1305) Yes one month (A1306)	mental work study-time
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Table 6. Original data codes of A14-18 driving school students

interviewees	original data	open decoding
A14	Introduction of acquaintances (A1401) Good (A1402) Do not claim (A1403) Happy (A1404) Brain power (A1405) Received in 3 months (A1406)	social network service attitude personal qualities learning mood mental work study-time
A15	Introduction of acquaintances (A1501) Good (A1502) Normal (A1503) Happy (A1504) The combination of brain and body will learn faster and find more ways (A1505) No (A1506)	social network service attitude personal qualities learning mood physical work, mental work study-time
A16	Relatively large scale (A1601) Excellent, the coach is strict, serious and responsible (A1602) Hope the coach can give us a little more advice (A1603) Pleasant (A1604) Both mental and physical work (A1605) Haven't got a driver's license (A1606)	school size work attitude work method learning mood physical work, mental work study-time
A17	Recommended by a friend (A1701) Good (A1702) I didn't expect it for a while (A1703) It's pretty fun (A1704) For me, it belongs to brain power (A1705) Studying hard (A1706)	social network service attitude personal qualities learning mood mental work study-time
A18	Introduced by others (A1801) Good (A1802) Teach well and be tough when it should be tough (A1803) The whole process is quite pleasant (A1804) Mental work (A1805) One and a half years (A1806)	social network service attitude teaching attitude learning mood mental work study-time

3.4 Theoretical Saturation Test

Theoretical Saturation Test, as a criterion for deciding when to stop sampling, is the moment when no additional data is available to allow the analyst to further develop the characteristics of a certain category, and a study is comprehensive if new cases can no longer shake the previous themes or assumptions. (Li Y., et al. 2018) [12]. After analyzing the content of the interview materials with other coaches and trainees, no new concepts and categories were found. Therefore, the concepts and categories of knowledge work productivity synergies are theoretically saturated, and the theoretical assumptions of knowledge work productivity synergy mechanisms are comprehensive, which meets the standard of theoretical saturation test.

4 Research Results and Discussion

Based on the research results obtained from the above grounded theory coding method, this paper summarizes the theoretical research hypotheses proposed. Profit is an important indicator of productivity, and profit will directly lead to the level of productivity, so hypothesis 1 is established: There is a positive correlation between productivity

and profit, and the productivity effect positively affects the profit effect. Learning ability, learning curve, learning experience, intellectual capital, and organizational culture have a moderating relationship between individual productivity and team productivity. Hypothesis 2c is established; the influencing factors of knowledge work productivity are related to knowledge work productivity. Knowledge workers' knowledge skills, positive emotions, work practices are significantly and positively related to work productivity; organizational change, knowledge management, and incentive policies are significantly related to knowledge work productivity; social environment is significantly related to knowledge work productivity; knowledge sharing, knowledge creation, and knowledge utilization are positively related to knowledge work productivity; Hypothesis 3a, 3b, 3c, 3d are established; collaborative network positively affects knowledge work productivity, hypothesis 4 is established. However, other hypotheses have no significant effect in the sample of this study, and the relevant conclusions need to be verified.

Table 7. Refinement Coding of the Main Category (Coach Edition)

conceptualization	categorization	main category
attention, understanding, quality, character, will quality	mental model	
work attitude, work spirit, enthusiasm for work, work discipline,	emotional patterns	knowledge worker cognitive ability
working ability, work method ability to work work motivation seniority	self-efficacy	
work motivation, career development	career	
good reputation students social relationship	social network	social support
price, time, labor, capital, knowledge, experience, platform construction, manual labor, mental labor	work input	knowledge work productivity representation dimensions
job satisfaction pass rate, student pass rate, job evaluation, profit margin, work quality happiness at work, work achievement	work outputs	

Table 8. Refinement Coding of the Main Category (student edition)

conceptualization	categorization	main category
quality, character, Will quality	mental model	knowledge worker cognitive ability
working ability	self-efficacy	
reputation school size Admissions Process	organizational resources	organizational support

price learning distance study-time	cost theory	
learning process learning mood	process theory	efficiency effect benefit
learning quality Service attitude	work output	

Based on the results and the theory of knowledge work input-output, this paper constructs the theoretical model framework of knowledge work productivity synergy input-output, as shown in Figure 1. Therefore, the key content of the measurement of knowledge work productivity synergy effect is to take knowledge work input and output as the core research variables, explore the intermediary variables and other mediating variables such as knowledge sharing, knowledge creation, incentive mechanism, career management, technological innovation, learning curve, collaborative network, and explore various direct and indirect effects in the process of knowledge work productivity input and output, and also explore the important impact of knowledge employee characteristics such as mental models, emotional characteristics, and self-efficacy on the role of knowledge work subjects. Further research on the important role of work productivity in employees' production performance and work happiness.

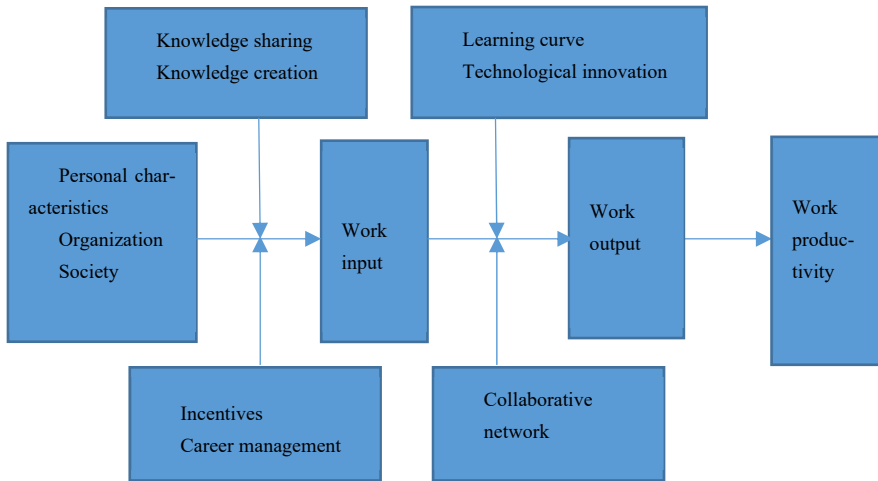


Fig. 1. Input-output model of knowledge work productivity synergistic effects

5 Conclusions

5.1 Theoretical contributions

Firstly, verification of these theoretical assumptions broadens the thinking for the research of knowledge work productivity, and also determines the research direction for the improvement of knowledge work productivity. Secondly, this paper constructs the input-output model framework of knowledge work productivity synergy, expands the input-output process of traditional productivity, and focuses on both the results of measurement and the process of productivity measurement. Thirdly, through the grounded theory method, this paper extracts the main categories of knowledge work productivity synergy, including knowledge worker cognition, knowledge work productivity dimension, organizational support, and social support. Therefore, appropriate measurement dimensions should be used in the evaluation process of research productivity. In the process of productivity research, organizational resources and social support are also important influencing factors of productivity development, which should be recognized by organizations and society as much as possible.

5.2 Research limitations and future prospects

The universality and ductility of the empirical research results need to be verified, and the sample size is small, and its validity needs to be strengthened. The research can select Internet companies, start-ups and other high-tech information technology enterprises as the research objects to further verify the moderating variables and intermediary variables that affect the productivity level of knowledge work, and further study knowledge creation, knowledge transfer, technological innovation, and collaborative networks. In the future we can discuss the impact of knowledge governance capability on knowledge work productivity and digital productivity. Digital productivity is advanced technological productivity, we can discuss the topic of remodeling mechanism, synergy effect and model innovation of data governance to improve digital productivity of enterprises.

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