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Talent Management with Blockchain Approach

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ABSTRACT

Talent development is essential task to ensure all staffs reach minimum competency levels as expected by the organization. The complexity of talent development increases along with the wider range of organization level. The article takes a case study of PN, an Indonesian state-owned energy company that operates in nationwide. Indonesia has thousand islands, and many remote areas surrounds with mountains; have created difficult efforts to develop talent in those remote areas. Currently, PN has more than 40 thousand staffs nationwide, and director of company has emphasized the use of latest IT technology to support talent development process. The article proposes the use of blockchain technology to support MOOC delivery to support talent development process and talent placement in new position. Blockchain technology has two advantages such as: secure access (unalterable data) and distributable to registered member. The use of blockchain to support corporate program to prepare readiness of all talents ready to cope with global and national uncertainty in energy industry. The outcome of article is expected to be used in other state-owned companies to prepare talent readiness.

Key words: *Talent development, MOOC, blockchain technology, an energy company. talent placement.*

1. INTRODUCTION

Improving staff competence has become major attention for all companies [1], [2]. Fierce competition has driven all companies to prepare qualified staff to ensure them survive in the market. Having qualified staff has become a major priority for all companies [2]. Although it is important, many enterprises have difficulty improving staff competences, especially for those are operating in nationwide. In digital era, more and more companies have applied online learning with several considerations: (1). to reduce learning costs; (2). to simplify and reuse Training Need Assessment (TNA) process; (3). To faster introducing online learning materials to learners; (4). Streamline unnecessary learning costs with online learning system.

Since 2020, Covid pandemic has encouraged Indonesian companies intensively apply hybrid method that comprises of online and offline learning methods [3]. Introduction of online learning technology is aligned with major company objectives that face with economic slowdown, fierce competition, uncertainty in industry environment, and the urgency needs to streamline learning costs, while on the other hand, corporations need to effectively utilize recent IT technologies to improve staff competences. The article takes a case study of PN, a state-owned energy company that faces major global energy uncertainty and budget cuts in learning costs, however, still required to boost staff productivity.

PN director has mandated its Corporate University (Corpu) to maximize the use of hybrid learning, through introducing Massive Open Online Course (MOOC), learning system that is tailored to the specific needs of the company. Currently, Corpu has setup strategic alliance with major universities, education providers and IT security vendor to design and deploy MOOC for more of its 40 thousand staffs nationwide. Currently, Corpu has 11 training centers (TCs) that are spread in major cities and has mission to prepare world class professional in energy industry. In recent years, PN director has carried many organization restructuring programs that requires many talent placements including retraining current staffs with advance knowledge to cope with global energy uncertainty such as: restructuring generator sources, renewable energy, optimizing energy outputs, and so-on.

The MOOC system is prioritized due to its flexibility and fast material delivery [4]. The MOOC delivery in Corpu is developed into several sequential steps of learning such as: novice, intermediate and advanced levels, that allows all learners to proceed step by step. Currently, there are thousands of certification program has been introduced to all staffs in hybrid mode. The director of the company has supported the introduction of MOOC delivery, as a pilot project for all its divisions. The article proposes the use of blockchain technology to manage MOOC mechanism. The blockchain technology has key advantages in security and transferable access to authorized person [5].

The use of blockchain technology in MOOC mechanism, has assisted the Human Capital (HC) and Corpu easy to prepare career placement and monitor the competence progress of their staff. Any staff in remote area can easily access the learning materials and proceed with the required certification and continued with next task assignment. New career assignment depends on progress of talent development. If the learning process runs slow will deliver impact to his/her career.

As a state-owned company, PN must deal with global issues [6] such as increasing coal and gas prices, while in domestic, PN deals with increasing energy demands from industries and households, and also government program such as promoting renewable energy [7], optimizing energy outputs, and many national agenda needs to be implemented as soon as possible. Due to many uncertainties and environmental complexity [8], PN directors have mandated Corpu to intensively embrace latest IT technology and prepare immediate talents readiness to cope with business and global environment uncertainty.

The HC department has appreciated the use of blockchain technology [9] to support certification and career development program to ensure succession plan runs smooth. There is frequent career mobility takes place in PN company in recent years, and Corpu is expected to prepare ready-to-work talents. New talent is expected ready to fill career gap that frequently occurs. Blockchain is considered as an important solution to address talent development issues [10].

The use of blockchain allows the talent development program can be conducted in rural areas with MOOC system, and immediate learning and career placements. The progress of learning is recorded in MOOC system and secured with blockchain system [11]. Blockchain allows only assigned talents can join MOOC system. It prohibits testing materials and scoring leakages, and other cheating forms that frequently take place. The use of blockchain ensure to eliminate certification fraudulence and incompetent talent placement. Blockchain provides historical tracking and unalterable data to eliminate any cronyism practices that might take place [11]. The outcome of the article is expected to provide easy talent development and placement. Security concern and easy access are common issues that raised by management can be solved through easy management with blockchain technology.

2. THEORETICAL FRAMEWORK

2.1. Talent Management

Talent management has become main priority for all companies. Although it is important, many companies do not have proper talent management system to identify the critical skills of its staff. Lewis and Heckman [12] address the importance of company to identify all talents into 2 domains [13]: difficulty-to-replace and value added (see Table 1):

Table 1. Talent classified by difficulty-to-replace and value (Lewis and Heckman [12]).

Difficult to replace		
Difficult to replace	Difficult to replace	
Low value added	High value added	
Easy to replace	Easy to replace	
Low value added	High value added	
	Value added	

PN company has applied restructuring programs in recent years to address global and domestic industry uncertainty, and ensure the new talent is ready to work. In the beginning of year, HC and Corpu need to map the talent utilization to fill new position. Organisation restructuring has become annual agenda that promote PN company to the world class energy company.

To carry out this mission, HC and Corpu have made classification of their staff and available positions based on talent classification as shown in table 1 with priority to address such as: '*difficult to replace*' and '*high value added*' category. For '*difficult to replace*' category, Corpu needs provide more talents. It usually takes years to do it. With the blockchain technology, Corpu can accelerate talent development program through encouraging any potential talents to take MOOC materials. In recent years, Corpu has restructured learning program and promoting major positions to the level of high valued added. By having '*high value added*' talents, Corpu can easily assign the talent to new position. In recent corporate goals, directors have mandated manager of Corpu to train all staffs to high value-added talents.

2.2. Blockchain.

In 2008, Satoshi Sakamoto proposes the term blockchain to serve as public distributed ledger for bitcoins cryptocurrency transactions [14]. The blockchain technology provides two key important features such as: unalterable data (immutable) and distributable access, that enables to remove a trusted authority or central server. The popularity of blockchain increases along with the popularity of cryptocurrencies [15]. Many countries have considered to deploy digital currency on blockchain platforms.

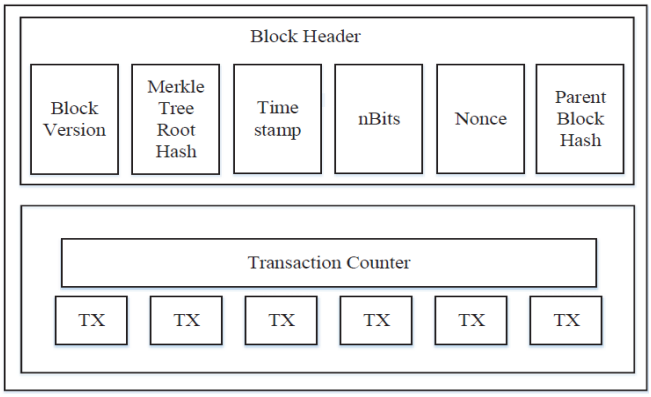

Figure.1: Block Structure [16].

The blockchain is sequence of blocks. The block structure is comprised of [16]: (see Figure 1)

- Block header comprises of:
  a. Block version indicates the software version and validation rules.
  b. Merkle tree root hash creates hash value of all transactions in the block.
  c. Timestamp consists of current universal time since January 1970.

d. nBits is the target threshold of a valid block hash.
e. Nonce, is an 4-byte field, usually starts with 0 and increases for every hash calculation.
f. Parent block hash, is a 256-bit hash value which indicates the previous block.

- Transaction counter records the number of transactions that have taken place within a specific block of a cryptocurrency's blockchain.

Wei et.al. addresses the application of blockchain technology in informationzation may face several challenges such as:

1. Identity management under multiple management domains. The resource utilization may face a condition such as multiple management domains means a staff can have multiple chain of order. This case may make identity management become difficult.
2. Hierarchical access control. Hierarchical access control can be problem for the staff that work in project team. PN has many project team that comprises of staff from several departments. Corpu has solved the hierarchical access control and delegate the TC manager to manage this access control through DPoS (Delegate Proof of Stake) mechanism.
3. Scalability optimization of information system. The MOOC deployment on blockchain platform may be slower than normal access. The IT and vendor have worked out the best solution to ensure the scalability optimization of information system related MOOC system deployment.
4. Affairs processing and status update based on smart contract. The blockchain technology provides smart contracts that allow course designers and PICs in universities and e-learning providers to work intensively through digital platform. Smart contract allows easy collaboration and payment mechanism.

3. RESEARCH METHOD

3.1. Blockchain Architecture.

The arrangement of sequence blocks in blockchain architecture is illustrated (Table 2) as [17]:

Table 2: Blockchain Architecture [17] .

Application Layer		Vendor Collaboration Application, Open API
Contract Layer		Algorithm, Smart Contract, Script Code
Incentive Layer		Issuance Mechanism, Allocation Mechanism
Consensus Layer		PoW, PoS, etc.
Network Layer		P2P Network, P2M Network, Communication Mechanism, Verification Mechanism
Data Layer		Data Block, Chain Structure, Time Stamp

The article applies complete blockchain architecture that comprises of (see Table 2):

1. Application layer. Blockchain application runs in this layer. The article integrates MOOC system with corporate ERP that links HC and Corpu, and third parties such as: universities, and e-learning providers.
2. Contract layer. The contract layer allows collaboration between TCs and third parties run smooth through smart contracts. Smart contract covers all materials that needed in MOOC system and deployment. The purchasing department in each TC can develop smart contracts with all vendors.
3. Incentive layer. The incentive layer supports the needs of Corpu and TC to develop new module and payment gateway to those third party. The bank transfer mechanism has been integrated in smart contract that enables course designers and Subject Matter Experts (SMEs) to collaborate with their partners in universities and e-learning providers.
4. Consensus layer. Consensus layer manages security mechanism for collaboration and ensures no fraudulence may take place starting career planing, learning process until job placement. Consensus layer comprises of: Proof-of-Work (PoW) and Proof-of-Stake (PoS) to manage data retrieval and member registration. The article also apply Delegate Proof-of-Stake (DPsS) for TC manager to manage project staffs in learning process.
5. Network layer. Network layer manages data transfer through P2P mechanism that allows staff in any place to access MOOC materials and job placement whenever is possible.
6. Data layer. Data layer consists of data blocks, chain structure, timestamp, merkle tree, nbits, hash algorithm, Nonce. Data comprises of career plan, MOOC materials and new possible placement.

3.2. Talent Development Framework

We apply the talent development framework that proposed in higher education (adapted from Wei et.al. [5]). The framework addressed the development digitization of high education has several important features:

1. Large-scale coverage. PN has more than 40 thousand staffs that spread in rural areas in nationwide, needs large-scale coverage to deploy MOOC system.
2. Digitalization. PN has collaborated with universities and major e-learning providers to digitalized learning materials and tied with career plan and placements. This collaboration is expected to support realization of world class e-learning system that emphasizes on convenience, personalization and intellectualization process.
3. Convenience. Collaboration with third parties enables Corpu to acquire the best practice learning system that emphasizes on improving learner experiences. The e-learning system is expected to provide convenience access for all learners where learning can be done in ubiquitously. By having convenience service, Corpu

expects to prepare more talents in '*difficult to replace*' category and produce more '*high-valued added*' talents in almost all positions.

4. Personalization. Personalization and convenience are the key features that should be built in all learning process. It also covers MOOC plan and delivery. The staff in remote area is expected to have similar experiences as his/her colleagues in major cities.
5. Intellectualization. The learning process is not only producing ready-to-work talents, but also high-quality manager that ready to fill in strategic position. Training high-quality manager needs intensive intellectualization program. For this reason, Corpu has established strategic collaboration with well-known universities to prepare future leaders. The use of blockchain solution secures the process of creating future leaders. Any possible fraudulence that might occur in the process can be audited and monitored. Blockchain technology guarantees all staff have fair treatment to become high-quality manager.

3.3. Data Gathering Method.

The article applies the data gathering method with major PICs in HC and Corpu department, with following research questions:

1. What is the talent development program to support MOOC delivery and job placement (career development).
2. What is the architecture distributed file system to ensure the successful of MOOC system under blockchain platform.

We explore the findings with observation, further interviews and Focus Group Discussion (FGD) with those major PICs.

4. DESIGN AND FINDING

Based on FGDs, we summarised the findings (Table 3) as follows:

Table 3. Data Gathering Results.

Findings	Respondents
We expect more talent development can be done through IT platforms with MOOC modules.	HC Staf
We expect to have seamless integration from career planning, talent development and new position placement. Current process takes too long with some unnecessary bureaucracy.	HC Staff
We receive many requests from departments regarding staff (talent) placement to specific position, however, we need longer time to train and allocate staffs to their requirements.	Talent Development Staff
We expect our staff to develop further competency to fill incoming job placement. So whenever there is job requirement, we can easily allocate the qualified staff to new position.	Talent Development Staff.
Risk analysis and corporate analysis takes longer time to accomplished, while the results should be implemented immediately. We have hard time to fulfill this requirement.	Talent Development Staff.
Current career plan, talent development and job placement are complicated process. Many staffs are willing to participate, however, they need to wait for further information.	TC manager.

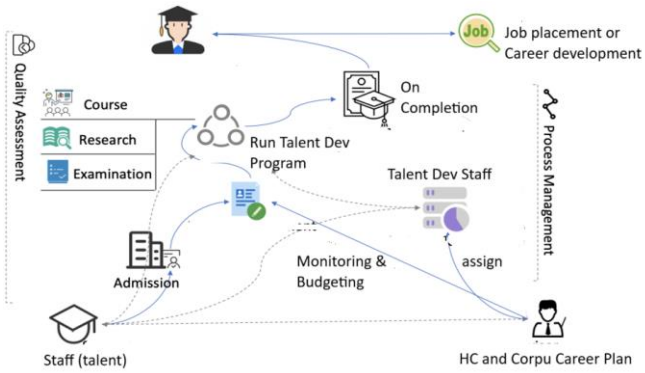

Figure 2: Talent Development Program (adapted from [5]

We apply the talent development framework (see Figure 2) as follow:

1. In the beginning year, HC and Corpu issue the corporate talent management program such as: career plan, talent development program, and career placements. The PN directors expects the career mobility should run smooth in all levels and has become annually routine agenda.
2. Talent development staff prepares the budget and operates Talent_Dev program that comprises of MOOC materials such as course, research, and examination. Research comprises of case studies and practical lab materials that supports the intellectualization process to train future leaders. Rigorous examination is conducted to ensure staff (talent) ready to hold new position or become expert in current work.
3. Selected staffs (talent) are invited to admission process where they can browse incoming position and career expectation. Staff can select basic materials, mandatory materials and optional materials to proceed. Optional materials are provided as additional values for the staff whenever career acceleration is needed. All learning process is secured with blockchain technology to ensure there is no possible cheating may take place and audit trials is provided with blockchain technology.
4. On learning completion, staff will earn certificate and followed with incoming job placement whenever is possible.

Each TC has its own competence to develop. We apply distributed file system that supports independency of TC to plan, develop, collaborate and deploy its own learning materials including MOOC system. The distributed file system ensures that all MOOC materials can be developed and accessed independently and simultaneously by both

course designers, Subject Matter Experts (SMEs), and staff from remote areas through cloud access. Whenever, there is poor connection in certain area, the staff can route the collaboration to nearest TC area to continue MOOC access. Distributed file system supports secure access and backups. In certain area where there may be some interruptions to learning process, the file system ensure learning continuity.

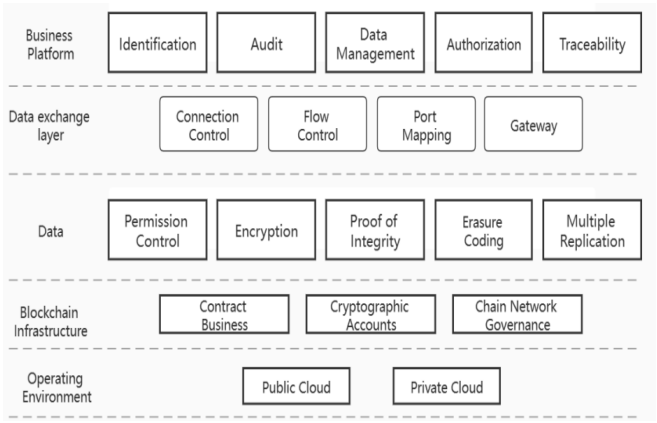

Figure 3: Architecture Practical Distributed File System (PDFS) [18].

We propose the architecture distributed file system (PDFS) to support MOOC delivery in nationwide as shown Figure 3 [18]:

- Business platform:
  - Identification. The MOOC system records learners into the system: learning module(s), learning time, progressing level, learner profile, etc.
  - Audit. The MOOC platform provides audit trails for course designers and management. Audit trait is important to detect whether fraudulence case is taken place.
  - Data management. Distributed file system supports flexible data management. Whenever there is lack of access in certain area, the MOOC system can switch to other available server. So the learning process will not interrupted.
  - Authorization. Blockchain administration ensures secure authorization only applies to registered member(s).
  - Traceability. Any fraudulent attempt can be traced and reported.
- Data exchange layer.
  - Connection control. The MOOC connection control is managed by corporate cloud access.
  - Flow control. Data flow control can be managed remotely in HQ to ensure secure and material available access.
  - Port mapping. Port mapping is established with registered e-learning vendors and third-parties.
  - Gateway. Payment gateway is linked to those third-parties and banks. Easy payment request and transferred payment can be done through this gateway.
- Data.
  - Permission control. Permission control is made based on task hierarchy from Corpu to nearest TC. Current manual permission control is migrated to digital process.
  - Encryption. Private and public encryption is made to ensure secure MOOC access.
  - Proof of integrity. We apply Proof-of-Work (PoW) and Proof-of-Stake (PoS). PoW manages MOOC material retrieval and task assignment, while PoS verifies the listed learner(s) can join into learning process.
  - Ensure coding. We cooperate with external vendor to ensure smooth MOOC development and access.
  - Mulitple replication. The MOOC modules can be accessed simultaneously in many remote locations. We expect many staffs in multiple areas can learn and prepare for the certifications and ready to fill new position.
- Blockchain infrastructure.
  - Contract business. Contract business is made digitally and linked with e-learning providers and universities.
  - Cryptographic accounts. Cryptographic accounts are monitored closely by IT security admin and IT security vendor.
  - Chain network governance. We ensure the transaction process is managed properly and reach SLA 90%.
- Operating environment.
  - Private cloud. We use corporate cloud to run MOOC modules.

5. CONCLUSION

Talent develoopment has become priority for many companies to support survival in the industry. The article takes case study, PN, a state-owned energy company that operates in Indonesia. In recent years, energy industry faces turbulence and uncertainty, such as high coal and gas prices, uncertainty in supplies, high demands come from industries and households, limited option to increase energy price, high government expectations, renewable energy substitution demands, etc. The PN directors need to restructure and prepare its talents to address those demands through the use of IT recent technology. The article proposes the use blockchain technology to provide secure access (unalterable data) and distributable access to registered members. The use of blockchain technology ensures all PN staffs including in remote area to attend talent development program that deployed on MOOC system. Preparing more than 40 thousand staffs is not an easy task, so the use of blockchain technology provides easy digital access through corporate cloud and secure audit trails that can be used from course designers and management to evaluate the progress of talent development.

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