

Offshore in Mobile App Development

Implementing 24-Hour Knowledge Factory

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Abstract

Mobile application market is one of the most rapidly growing markets. The market will reach \$58 billion by 2014 and it has created many business opportunities. However, hiring skillful app developers is very expensive in US, and traditional offshore has communication issues when using Agile or RAD approaches.

24-Hour Knowledge Factory (24HKF) paradigm can solve the addressed issues. 24HKF can utilize both RAD and Agile approaches with more interactions with clients, and doing so improving quality of outputs and mitigating communication barrier issues will be possible. This paper will focus on implementing 24HKF in mobile app development as a small company and discuss potential risks. Few modifications and suggestions are made toward the original concept to successfully implement 24HKF as a small company. Here are the suggestions:

- Before the actual implementation, start with two shifts at the offshore site as a pilot project
- Joint venture with existing offshore companies, but there will be more potential risks
- US site team will handle multiple projects
- US site team will allocate more time with clients and supervise ongoing projects

Overall, despite the challenges of implementing 24HKF as a small company, 24HKF still offers many competitive advantages that 24HKF will be shown as a benchmark model for offshoring mobile app development.

Keywords: 24-Hour Knowledge Factory (24HKF), Mobile App Development, Agile Software Development, Rapid Application Development (RAD)

Introduction: 24-Hour Knowledge Factory (24HKF) Paradigm

24HKF¹ is a new paradigm that connects globally distributed teams (GDTs) in different time zones to work on a project or around the clock (Gupta 227). 24HKF can be considered as a global three-shift model which each shift can work during the daytime. Based on “the Role of Information Resource Management in Enabling the 24-Hour Knowledge factory” (Seshasai & Gupta 2007), here are key main advantages of 24HKF:

- Project (development) cycle is faster by performing work over a 24-hour period.
- Overall efficiency and productive are improved.
- Bottlenecks issues will be reduced on a sequential basis projects.
- GDTs can work the normal daytime period (9 am to 5 pm) to maintain work productivity for long term projects.
- 24HKF endorses better team coordination and quality control than traditional offshore that can provide semi-structured works.

Software development is one of the areas where 24HKF can optimize its structured work. Tasks of software development can be broken: obtaining requirements from clients, designing specs and prototyping codes, and testing codes and receiving feedbacks from clients. With 24HKF, bottlenecks caused by sequential processes will be reduced, and it will utilize quality control and supervision.

This paper will focus on implementing 24HKF in mobile app development. Here are general characteristics of mobile application development. First, most mobile app development projects are outsourced or offshored. Second, most mobile app development projects use Agile (Agile Software Development) or RAD (Rapid Application Development) approach, which requires extensive interactions with clients. Third, many offshore mobile app development firms are small sized². In that

¹ For more information about 24HKF, please go to the link: (<http://next.eller.arizona.edu/projects/24hrkf/>)

² It is hard to define the actual size of specialized mobile app development service firms, but they are generally smaller than other IT service firms. Having 50 to 100 employees is considered as a big company for a specialized mobile app development service firm.

sense, this paper will focus on implementing 24HKF as small companies or startups. Moreover, potential issues of 24HKF and suggestions to mitigate risks will be discussed.

Opportunities from Mobile Application Market

Mobile application market has been one of the fastest growing markets despite the economic recession. Because mobile application market has been continuously evolving and growing rapidly, the market growth rate always has exceeded analysts' expectations. According to Juniper Research's 2010 report, they estimated that mobile application market revenue will reach \$25 billion by 2015. On the other hand, Gartner's 2011 report forecast the market revenue will reach \$29.5 billion by 2013 and \$58 billion by 2014. Considering that the market revenue was only \$4.2 billion in 2009 and \$5.2 billion in 2010 (Baghdassarian, et al., 2010), the potential growth of mobile app market is enormous.

There are two main reasons for such rapid growth in mobile application market. First, market share of smartphone has been increased exponentially since 2009. The Nielsen Company states that market share of smartphone in 2009 was 21%, but they discover that market share of smartphone will exceed standard phone's market share by end of 2011. Second, although competition arises in app store market, each platform has successfully increased their revenues. According to IHS, Apple's market share was decreased from 92.8% to 82.7% in 2010, and yet their revenue was increased by 131.9%. Android app store market revenue was also increased by 861.5% in 2010.

This rapidly growing market brings many business opportunities. Seeing Angry Bird's "overnight success," more startups jump into mobile app market everyday (Cheshire). For instance, according to McGuire Entrepreneurship Program³ class of 2011, 6 of 23 venture projects are delivering their services via mobile applications.

³ McGuire Entrepreneurship Program is offered by the University of Arizona as a double major. Throughout the program, students with different backgrounds (e.g. management, marketing, finance) form a team and work on a venture concept for a year. The venture teams will develop ideas to a venture concept, business model, write business plan, and finally present it to investors for capitals. For more information, please check the link: (<http://entrepreneurship.eller.arizona.edu/>).

Cost of Mobile App Development is too Expensive

Even though mobile application stores open the door for everyone to develop and sell their apps in the market, programming skills requirement sets a high barrier to entry. Developing an application requires to write sophisticated codes in Java or C/C++ with Assembly languages. Outsourcing mobile app development seems a good alternative solution for individuals and small startups without programming skills.

The main problem comes from high costs associated with outsourcing development. With rapid growth in mobile application market, it is not surprising to notice that app developers are high on demand but short on supply (Light). Under the circumstances, hiring app developers has been becoming more difficult and expensive. It is difficult to estimate the cost since each application development cost varies depending on complexity of codes and development time. App developers usually charge \$50 to \$150 per hour for each developer, and it takes 160 hours to 400 hours to develop an application. The former CEO of AppVee, Ahlund states that the average total application developing costs \$6,453 if development is done in house; if development is done outsourced, it will cost 5 to 10 times more than \$6,453. Despite the expensive expenditure on application development, skilled app developers prefer to work on their own projects because they expect more than 15 times return on their development cost (Ahlund).

An interview with Heinlein clearly demonstrates how expensive and difficult is to hire application developers for individuals or small startups. She is a marketing manager at F.I.T., which is one of the venture projects from McGuire Entrepreneurship Program at the University of Arizona. F.I.T. provides fitness solutions via the web and a smartphone application. Heinlein stated that it is very difficult for a startup to hire skilled app developers because skilled app developers do not accept small scaled jobs. F.I.T. concludes that they will outsource their mobile app development with \$110,000.

Offshore Mobile App Development Service

Offshore mobile app development can solve the high cost development problems. With technology advanced and new communication tools (e.g. VoIP), it is now feasible to offshore small scaled IT projects. However, even though cost of offshore app development is much cheaper than doing in in-house, traditional offshore faces a big problem – communication barrier caused by cultural and time zone difference. Nowadays, the majority of small scaled software developments use Agile (Agile Software Development) or RAD (Rapid Application Development), which both emphasizes active interactions with clients and feedbacks from clients on a regular basis. It is a big challenge for offshore mobile app development service to meet quality requirements when both clients and offshore firms face communication barrier with different time zones, different languages, and different cultures.

Competitive Advantages of 24 Hour Knowledge Factory (24HKF)

24HKF paradigm is designed not only to mitigate the addressed risks from traditional offshore, but also to improve efficiency and productivity. Competitive advantages of 24HKF over traditional offshore are significant. App development cycle is much faster than traditional offshore with 24HKF. It is critical to develop apps fast and release them before competitions. For instance, over 8,600 apps are submitted to Apple App Store in March 2011 (148Apps.biz). Among submitted apps, 60% of apps are rejected mainly due to similarity to other apps (Golijan). With 24HKF, clients can develop apps faster than their competitions as 24HKF facilitates 24 hours seamless app develop flow whereas traditional offshore only supports 8 to 10 hours work per day.

24HKF can mitigate risks associated with communication barrier and time difference. One of the major concerns in traditional offshore comes from communication barrier. With cultural difference and time difference, it is difficult for clients to communicate with an offshore site effectively. 24HKF can solve this issue by having US onsite teams. This way, clients can interact with US onsite teams without communication barrier caused by language difference. Ultimately, 24HKF will encourage more interactions to improve quality control and supervision on ongoing projects.

RAD (Rapid Application Development) Vs. Agile (Agile Software Development)

Both RAD (Rapid Application Development) and Agile (Agile Software Development) methodologies are commonly used in mobile app development because they intend to minimize development time with a minimal planning. With RAD approach, clients actively participate in planning and user design phases to make agreements on key issues with development teams. Once requirements are defined, developers initiate development in construction phase and testing in cutover phase similar to the SDLC (System Development Life Cycle) (Shelly 2009). The main advantages of RAD are rapid short development time and rapid modifications on prototypes. With a collaborative and dynamic atmosphere, it is easier to obtain more requirements from clients. Agile is also designed to minimize development process but focuses more on incremental improvements for adaptive environment (Shelly 2009). In that sense, Agile emphasizes real time communication with clients such as videoconferencing. Clients obtain work progress report on a daily basis and provide feedbacks for modifications if needed, but it will lead project delays.

Both RAD and Agile are commonly used in traditional offshore. There are two main options for mobile app development offshore: hiring individual contractors or offshore the whole development project from other business third parties. Agile works better with managing contractors as clients want to control and work closely with contractors. Therefore, many agile-management tools are available for online websites for hiring contractors. For example, oDesk (<http://www.odesk.com/>) is a website that utilizes offshore remote staffing. The website provides synchronized communication tools and supervision tools which clients receive snapshots of work progress each hour. On the other hand, offshore the whole projects from third business parties supports both Agile and RAD, but more IT offshore firms appear to endorse agile approach than RAD⁴. At this point, it is unclear which software development methodology should be implemented with 24HKF paradigm, but theoretically 24HKF will work better with both approaches flawlessly than traditional application development offshore.

⁴ Based on Google keyword search, Agile has more query results than RAD or Rapid Application Development.

Communication between clients and developers are critical for both RAD and Agile. By having an US onsite team, it will be easier for clients to interact with developers in US without communication barrier and time zone difference. In conclusion, choosing RAD or Agile really depends on clients' preferences, but agile approach will be most benefited from 24HKF paradigm.

Location Selection

To utilize 24HKF paradigm, three global locations in different time zones need to be placed. One global location will be located in US since they will work closely with clients. India and Belarus are chosen for offshore sites with two main criteria: low cost and human resource availability. India is chosen because India has outperformed IT offshore market for decades and India is still top number one for knowledge-based offshore services (Gartner). Belarus is also chosen for the third offshore site. Belarus was considered as the “Silicon Valley” of the former USSR, and now IT offshore is one of the fastest growing markets in Belarus with their IT infrastructure (Emigh). With government support and cheap labors, Belarus has become very popular for IT offshore targeting European clients.

Three Global Locations Vs. Two Global Locations with Two Shifts

24HKF primarily endorses global locations with three different time zones with a belief that “a person can work most effectively during the normal daytime work period (roughly from 9 am to 5pm)” (Seshasai & Gupta 2007). However, as startups or existing small scaled IT offshore firms, setting up three global locations can raise many obstacles. High startup and exit cost can be a big huddle. Moreover, having three global locations raises not only cost issue but also scalability issues. Having more employees can cause low scalability and agility which can be critical for small firms with low cash flow balance. Another main concern comes from management capability. It is difficult for small companies to set up global two other locations, hire skillful managers, and manage offshore sites. Moreover, dealing with three different languages as well as cultures will give a great burden on management. Therefore, without a huge financial commitment and experienced management, implementing 24HKF with three global locations may create more risks than benefits.

Despite the addressed risks, 24HKF still has many benefits over a traditional offshore model. Operating two shifts at the offshore site can reduce the addressed risks. Here is an example of applying the two shifts model in 24HKF. US onsite team works from 10 am till 6:30 pm (PST), and Indian offshore team, which is first shift, takes over the work from 6:30 am till 2:00 pm (IST). Second shift comes to work at 1:30 pm and takes over the work after a 30 minute meeting with the first shift. Second shift will work from 1:30 pm till 10 pm, and US onsite team takes over the work from the second shift at 10 am (PST) (See Figure 1.1). This way, 24HKF paradigm can function with two global locations. Benefits from operating two shifts model are clear. Two shift model has lower startup and exit cost. With less startup and sunk cost, two shifts model is more scalable. The main advantage of operating two shifts at offshore site is that management and communication is easier than operating three global locations in different time zones. “Use of Collaborative Technologies and Knowledge Sharing in co-located and Distributed Teams: Towards the 24-h Knowledge Factory” (Gupta, Mattarelli, et al., 2009) proves there is no significant differences of efficiency and quality of outcomes between globally distributed teams (GDTs) and co-located teams. However, there is no evidence that operating three global locations for sequential based projects will have the same result. Thus, companies should start with the two shifts model as a pilot project for 24HKF implementation. Management and GDTs will learn and adapt to 24HKF paradigm with less risks during the pilot test stage, and then they can decide whether they want to expand another global offshore site or stay as is. Not being able to “follow the Sun” is a big tradeoff for the two shifts model, but it will be easier to implement 24HKF with less risks.

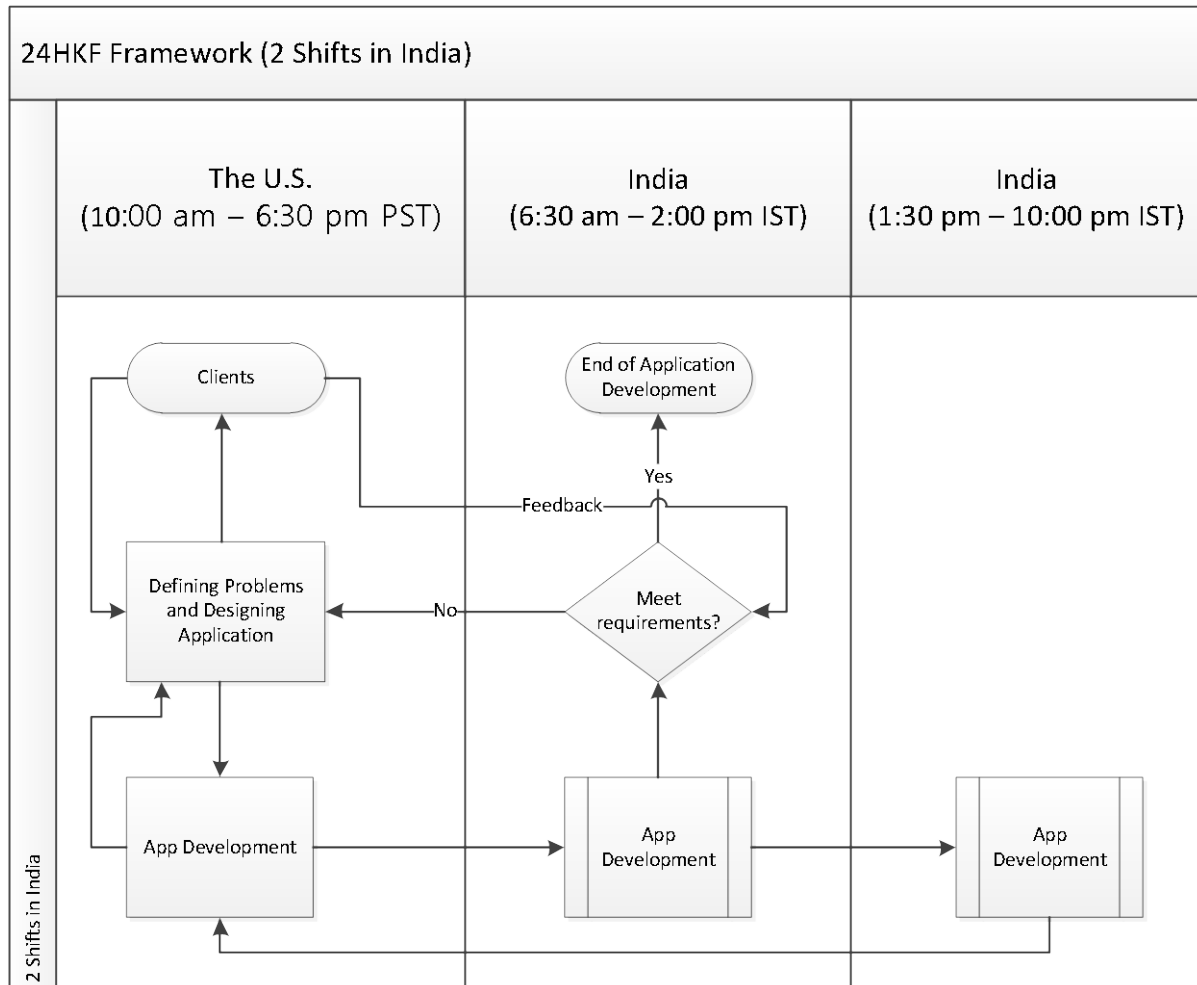


Figure 1.1 (2 Shifts Model)

Joint Venture with Existing Offshore Companies

This paper assumes implementation of 24HKF will be done in house. As discussed, small companies or startups will face many issues setting up offshore sites due to lack of management capability and high startup and exit cost. Joint venture with existing offshore firms may be easier for small companies to implement 24HKF. However, there will be more potential issues associated with joint venture. Here are the lists:

- Legal issues
- Partner selection
- Management issues and conflict management
- Standardization issues (each company has a different national and office culture, and

management style)

- Differences in the level of investment and resources brought by joint venture partners

Role of US Onsite Team

According to “Towards the 24-Hour Knowledge Factory: Offshore-Onsite Team Dynamics” (Gupta, Mattarelli, et al., 2007), work performance and employee satisfaction is better when GDTs have similar authority and work on similar work task. However, unlike other professional offshore, interaction with clients is most critical factor for success in app development with both RAD and Agile approaches. In that sense, this paper suggests US onsite team to dedicate more time with clients to obtain requirements and feedbacks for the projects. Doing so, bottleneck issues caused by waiting for responses from clients will be notably decreased and quality of the output will be improved as a result. In addition, this approach motivates US onsite development teams to allocate more than one project. With an assumption that three GDTs can only handle one app development project, overhead cost of hiring extra personnel in US onsite will be substantial and will not be scalable. If an US project manager with his/her app development team can handle multiple projects simultaneously on a daily basis, operation will be more efficient and lean.

Implementing 24HKF

Here is a general overview of applying 24HKF in app development. During planning stage, clients will actively interact with an US project manager and app designer to define requirements for the app. Once defined, the project manager will initiate app development with other two offshore sites. The US site will start designing and developing the app between 10:00 am and 6:30 pm (PST). Indian offshore team will start their shift at 6:30 am in India, which is 6:00 pm in US (PST). During a 30 minutes overlaps, US and Indian development teams will discuss about progresses US team has made and what needs to be done via videoconferencing. Then Indian offshore teams will take over and continue developing (6:30 am – 3:30 pm IST). Belarus offshore team will start their shift at 12:30 pm in their time, which is 3:00 pm in India (IST). Both Indian and Belarus team will have a discussion about a

direction of app development via videoconferencing. Belarus offshore team will work between 12:30 pm and 8:30 pm, and US team will start their shift 30 minutes before Belarus team takes off work. In summary, US onsite team works for 8 hours and 30 minutes; Indian team works for 9 hours and Belarus team works for 8 hours. There will be three 30 minutes gaps between shifts for videoconferencing and one hour break for each team, but 19 hours and 30 minutes will be allocated toward app development every day. Clients can review work progress on a daily basis and give feedbacks. Each US onsite team will be assigned to four projects so that the team can allocate two hours for each project. US onsite team will supervise offshore teams' work progress, interact with clients, define requirements, and specify tasks for offshore teams (See Figure 1.2).

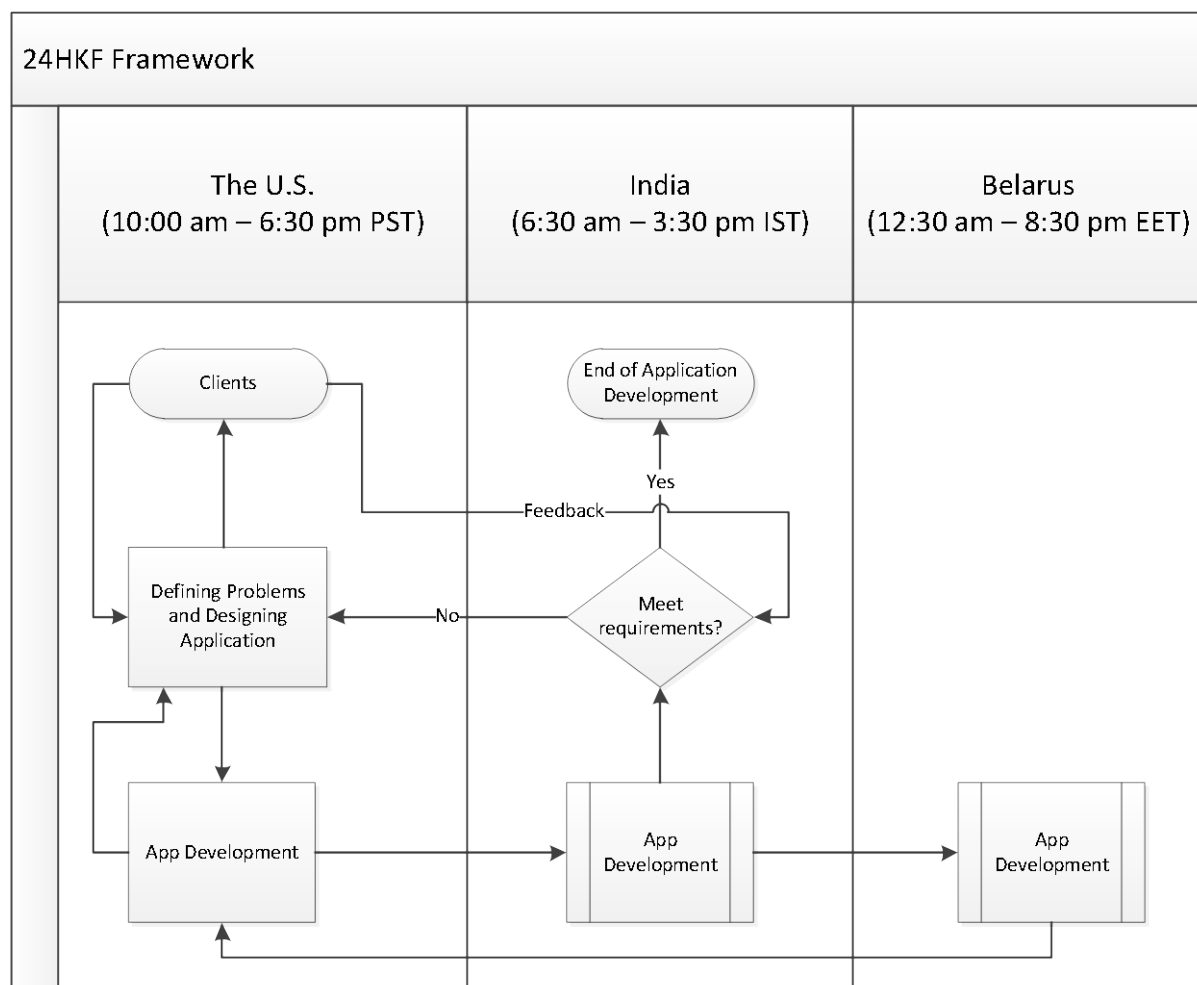


Figure 1.2 (24HKF Implementation with 3 global locations)

Here are more details. Offshore teams consist with a project manager and 5 to 9 app developers and are only responsible for one specific project at a time. App designers work closely with US onsite teams, which will give more authority to US onsite teams. US project managers lead development projects as they will act as middlemen between clients and development teams. Communication with clients is mainly done by US project managers, but clients also can contact other offshore sites' project managers when necessary, and vice versa. Because many mobile apps are targeting specific US customers in contemporary culture, it is critical that offshore teams need to understand US contemporary culture while developing. Therefore, offshore sites' project managers must come from local who are culturally aware of US (preferably who had lived in US). Excellent communication skill is also required for project managers to mitigate communication barrier.

Conclusion

In summary, mobile app development will be benefited from 24HKF. 24HKF facilitates more interactions with clients and quality controls for Agile and RAD approaches. Also, 24HKF can mitigate risks from communication and cultural barrier. However, it is difficult for small companies or startups to implement 24HKF due to requiring a huge financial commitment and lack of management capability. As a pilot program, small companies can start with two shifts at offshore site or they can joint venture with existing offshore companies, but this paper does not validate the assumptions that further research is required.

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