

**IEBMC 2019****9th International Economics and Business Management Conference****APPLICATION OF CANCER DETECTION CRAWLER AS AN  
EARLY CANCER DETECTION EVALUATION SYSTEM**

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***Abstract***

Cancer is one of the top 10 deadliest diseases in the world. Initial shock from being diagnosed with cancer gives way to a realization of the tremendous physical, emotional, and spiritual challenges that lie ahead. Beyond the emotional turmoil that accompanies a cancer diagnosis, patients face a practical necessity to develop a plan to live with and fight cancer. Statistics released by Malaysia's Ministry of Health (MOH) in 2016 indicated that cancer is the third highest cause of death in government hospitals in the country and the number increased alarmingly since 1996 (8.9%, 13.6%). The situation necessitated the creation of a system/application with the ability to detect cancer at early stage and accumulate such information in a database form accessible to relevant bodies to enable immediate actions. The possible early detection of cancer may able to change individuals' course of life. CANCER DETECTION CRAWLER (CDC) is an early detection system for cancer treatments that identifies and provides abnormal health level data/statistics of individuals who are potential cancer patients (and subsequently, referral for treatments) to related bodies such as MAKNA (Majlis Kanser Negara) and other Medical Institutions. Further, CDC is fabricated with the ability to suggest healthy life styles options to its user while functioning as a self-health-monitoring device. The outcome of this project is the creation of a system that will increase Institut Kanser Negara (IKN), MAKNA and other medical bodies' efficiencies in delivering and assisting all current and post treatment procedures to cancer patients.

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**Keywords:** Cancer, awareness, cancer detection crawler, medical institutions.



## 1. Introduction

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. These contrast with benign tumors, which do not spread. Possible signs and symptoms include a lump, abnormal bleeding, prolonged cough, unexplained weight loss and a change in bowel movements. While these symptoms may indicate cancer, they can also have other causes. Over 100 types of cancers affect humans.

Early diagnosis of cancer focuses on detecting symptomatic patients as early as possible so they have the best chance for successful treatment. When cancer care is delayed or inaccessible there is a lower chance of survival, greater problems associated with treatment and higher costs of care. Early diagnosis improves cancer outcomes by providing care at the earliest possible stage and is therefore an important public health strategy in all settings.

Screening is a different strategy than early diagnosis. It is defined as the presumptive identification of unrecognized disease in an apparently healthy, asymptomatic population by means of tests, examinations or other procedures that can be applied rapidly and easily to the target population. A screening programme must include all the core components in the screening process from inviting the target population to accessing effective treatment for individuals diagnosed with disease.

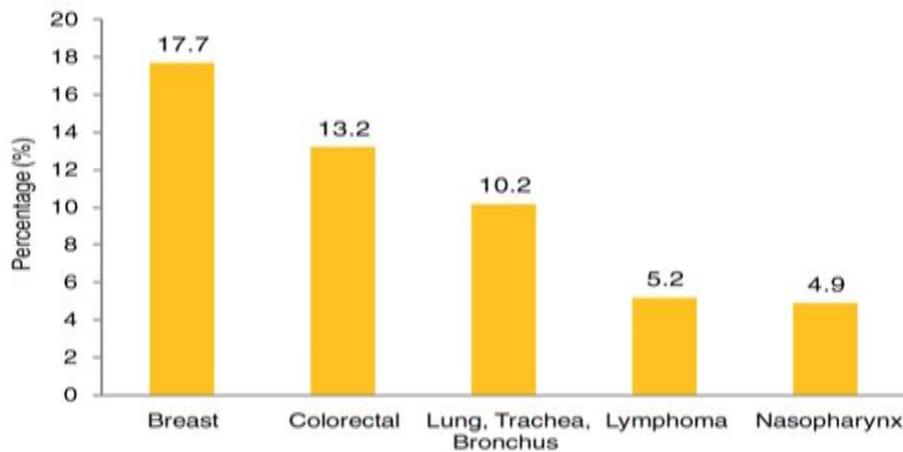
## 2. Problem Statement

Over 100,000 Malaysians live with cancer at any given time, with 1 in 10 men, and 1 in 9 women at risk of getting the disease in their lifetime (Al-Hosni et al., 2020). Cancer is also the 4th largest cause of death in the country (see figure 01). It is the 1st cause of death in private hospitals, and the 4th cause of death in public hospitals.

In Malaysia, cancer is often detected or diagnosed late. Over half of all Malaysian cancer patients are diagnosed at late stages (III or IV). This is very important cause the later patients are diagnosed, the poorer their chances are of survival. For example, the 5-year survival rate of colorectal cancer is 76% if diagnosed at stage I, and 17% if diagnosed at stage IV. Currently, 1 in 3 colorectal cancer patients in Malaysia are diagnosed at this last stage. Early intervention not only saves lives, but is highly cost effective. A study based in U.S. estimates early diagnosis of cancer can save the country up to USD26 billion in a year.

Challenges in dealing with potential cancer patients are:

1. Lack of resources for early detection, screening or diagnosis.
2. Poor health literacy. A Malaysian study of 345 cancer patients in the B40 group revealed that 60% had limited cancer health literacy. Health Literacy is defined as more than “being able to read pamphlets and successfully make appointments.” It is also defined as understanding [the disease] enough to make sound health decisions.
3. Poor uptake of opportunistic screenings offered by the Government, whether free or at a subsidized cost. For example, mammography uptake from year 2006 to 2015 in Malaysia ranged between 3.6% and 30.9%. Reasons included lack of knowledge of (and where to go for) mammograms, embarrassment and fear.



**Figure 01.** Five (5) most common cancers in Malaysia

In a progress of beating cancer, early detection and diagnosis is arguably the single most important and impactful objective we can have. Patients diagnosed early have the best chance of curative treatment and long-term survival. Despite this, only 55% of cancers are currently detected early in England, for example. There is a pressing need to see a paradigm shift in our ability to accurately detect and diagnose cancer at an early stage to transform health outcomes, in a field beset by scientific and health system challenges.

Whilst the UK has witnessed a growth in the incidence of cancer in recent years, mortality rates for the disease have decreased over the same period. This has been attributed to a variety of factors including better targeting of those at elevated risk, development of screening tests with improved predictive values, timely diagnosis and the provision of more effective treatments. An important concept underpinning much of this work has been secondary prevention, which is based on the premise that the earlier cancer is diagnosed the better the outcomes.

In future where the early detection and diagnosis of cancer (ED&D) is prioritised, incentivised and routinely embedded in UK research, development and health systems, as part of a paradigm shift towards proactive health management of individuals (Chen & Zhao, 2019). ED&D will have a thriving multi-disciplinary and cross-sector research ecosystem that yields comprehensive insight into minimally invasive, cost-effective and publicly acceptable solutions, with a state-of-the-art system for evaluation, regulation and uptake, to ensure ED&D is a routine reality. Patients and the public will be actively engaged in ED&D, championing its transformative potential to improve health outcomes. (Ford & Farah, 2013). In fact, almost half of cancer cases can be prevented through healthy lifestyles, and early detection greatly increases the chances of a patient's survival (Ott et al., 2009).

### 3. Research Questions

The research questions for this study are as follows:

1. Why an early detection system for cancer treatments is vital for Medical Institutions in Malaysia?
2. How to develop an early detection system for cancer treatments that identifies and provides abnormal health level data/statistics of individuals who are potential cancer patients?

## **4. Purpose of the Study**

The purpose of this study can be outlined as follows:

1. To explore the importance of an early detection system for cancer treatments for Medical Institutions in Malaysia.
2. To develop and validate an early detection system for cancer treatments that identifies and provides abnormal health level data/statistics of individuals who are potential cancer patients.

## **5. Research Methods**

This study use trigulation methods based on observation techniques, expert opinion, and literature and existing knowledge in this area (Moon, 2019)

### **5.1. Proposal Solution**

This system will fabricate with the ability to suggest healthy life styles options to its user while functioning as a self-health-monitoring device. This system will contribute by enhancing the level of awareness about cancer to society and develop a cancer-ready society by distributing knowledge about symptoms of cancers and the possible treatments. The outcome of this project is the creation of a system that will increase MAKNA and other medical bodies' efficiencies in delivering and assisting all pre, current and post treatment procedures to cancer patients. The market potential of this system/application are MAKNA, Medical Institution and insurance providers.

## **6. Findings**

This system will fabricate with the ability to suggest healthy life styles options to its user while functioning as a self-health-monitoring device. This system will contribute by enhancing the level of awareness about cancer to society and develop a cancer-ready society by distributing knowledge about symptoms of cancers and the possible treatments. The outcome of this project is the creation of a system that will increase MAKNA and other medical bodies' efficiencies in delivering and assisting all pre, current and post treatment procedures to cancer patients. The market potential of this system/application are MAKNA, Medical Institution and insurance providers.

### **6.1. Impacts of Cancer Detection Crawler (CDC)**

The system is expected to benefit to the society, economy and nation.

#### **6.1.1. Impact to the Society**

The foremost climax of an early detection system for cancer treatments that identifies and provides abnormal health level data/statistics of individuals who are potential cancer patients (and subsequently, referral for treatments) to related bodies such as MAKNA (Majlis Kanser Negara) and other Medical Institutions through selected procedures such as Clinical breast exams, Mammograms, Pap tests and others.

### **6.1.2. Impact to the Economy**

Economy:

- Environment and Technology Benefit: Eliminate waste and resources; improve Green

Health Management activity and reduced documentation cost.

- Research and Education: Teaching tool and literature contribution

### **6.1.3. Impact to the Nation**

This study will benefit the nation through as highlighted in the 11th Malaysia's Plan under Strategy Improving Well-being for All.

Through Strategy Improving Well-being for All, the government has always adopted balanced development approach that gives equal emphasis to both economic growth and the well-being of the rakyat. Well-being refers to a standard of living and quality of life that addresses an individual's socioeconomic, physical and psychological needs

### **6.1.4. Usefulness and Application**

- 1) paperless;
- 2) proficient organizational process (speed & protection to valuable information);
- 3) reducing disbursement;
- 4) increasing practicality;
- 5) increasing integrity and trust to the department;
- 6) become a pioneer;
- 7) assuring software interoperability and meeting current standards.

### **6.1.5. Technology Description**

CDC system has two main functions which are; 1) admin, 2) user (potential patients). The two views have quite varied processes and are illustrated as below figure. See figure 01.

The procedures for each user is illuminate as below:

#### **User's process flow**

- i. The users need to register in online registration
- ii. The users need to wait the administrator to approve the registration from the email successful activation. This step is very crucial stage since the system will highlight red colours on the application of fake account based on invalid Identification Number. This initiative is to protect the function of early detection value and to avoid invalid data and information.
- iii. Once the registration is successful. The user may undergo the three stages of early detection tests. There are three stages of early detection test. First stage, the users need to declare to the system based on the current health condition. The system will ask the user to declare in terms of family history, any bleeding, cyst or fibroid history ,age and period cycle. If after the users undergo the

first stage and the system found that 4 of 6 items were found out abnormal, the system will notify the user to undergo for second stage early detection.

- iv. In the second stage early detection, the system will direct the user to undergo to types of test for example blood test and treatment suggestion will be CT Scan and other treatment. This is the foremost uniqueness about this application where the system will also direct and lead the user on suggestion treatment.
- v. Third stage of early detection ,once the user is confirmed as cancer patient, the system will indicate and notify the user on type of advance treatments for instance Chemotherapy, Sigmoidoscopy and PET-CT Scan. The uniqueness of this function is giving the priority to those who suffered with Stage 3 and Stage 4 Cancer to cut the queue for treatment. Since, in Malaysia there are only two centre for Radiography ,the system will lead the health institutions for priority listing based on urgent cases. This function also will give an advance acknowledgement for the cancer patients to be ready for cost, treatment process and mentally and physically to fight the cancer.
- vi. The ultimate of user function is the issuance of Pink Card. The pink card may be used as privilege card to get activity exemption from the work organization and additional discount for medication cost. The Pink Card Holder will give more benefit and advantages to the card holder based on what will be stated in government budget allocation and towards “Zero Cancer Worries” society.

#### **6.1.6. Admin’s process flow**

- i. In CDC system, the administrator have five main functions are (a) Manage Patients,(b) Manage List of Patients, (c ) Manage Administrator, (d) Analyze Overall Health Report, (e ) Report and Statistics.
- ii. First function ( Manage Patients) ,in this function the administrator may need to uphold the integrity values as they may need to approve the application which is genuine and with correct information.
- iii. Second function (Manage List of Patients),in this function the administrator will have to respond to the system for instance uploading the health report to the user interface, and monitoring the suggestion tests and treatments for the users.
- iv. Third function ( Manage Administrator),the administrator will assign the system assessor to monitor and control the system based on the standard and procedure.
- v. Fourth function (Analyze Overall Health Report),the administrator will have access to view overall report for every stages for all users based on current situation.
- vi. Five function (Report and Statistics) the administrator will get the actual data based on real time on overall statistic and information. The report can be a guidance for the top management of health institutions for future planning especially on budget allocation.

In this function, the CDC system will illustrate

- i) Total users for each types of early detection test

- ii) Total users based on every types of suggestion treatments
- iii) Total users on third stage of early detection which need the priority treatments.

Additionally, the system also enhance the validity of the report based on first approval and second approval to validate the report.

This is to support the conscientious and standard operating procedures in dealing with secrecy and confidential matters where the integrity plays main important role.

## 7. Conclusion

This system will fabricate with the ability to suggest healthy lifestyles options to its user while functioning as a self-health-monitoring device. This system will contribute by enhancing the level of awareness about cancer to society and develop a cancer-ready society by distributing knowledge about symptoms of cancers and the possible treatments. The outcome of this project is the creation of a system that will increase MAKNA and other medical bodies' efficiencies in delivering and assisting all pre, current and post treatment procedures to cancer patients. The market potential of this system/application are MAKNA, Medical Institution and insurance providers.

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## References

- Al-Hosni, K., Chan, M. F., & Al-Azri, M. (2020). The Effectiveness of Interventional Cancer Education Programs for School Students Aged 8–19 Years: a Systematic Review. *Journal of Cancer Education*, 1-11.
- Chen, M., & Zhao, H. (2019). Next-generation sequencing in liquid biopsy: cancer screening and early detection. *Human genomics*, 13(1), 34.
- Ford, P. J., & Farah, C. S. (2013). Early detection and diagnosis of oral cancer: Strategies for improvement. *Journal of Cancer Policy*, 1(1-2), e2-e7.
- Moon, M. D. (2019). Triangulation: A method to increase validity, reliability, and legitimation in clinical research. *Journal of Emergency Nursing*, 45(1), 103-105.
- Ott, J. J., Ullrich, A., & Miller, A. B. (2009). The importance of early symptom recognition in the context of early detection and cancer survival. *European Journal of Cancer*, 45(16), 2743-2748.