

# MEMPERKASA KEMAMPUAN OPERASI JAMBATAN TENTERA DARAT



Oleh Lt Kol Mohd Nordin bin T P Kunjipathy

"Bridges are always central features in war. Battles and campaigns are often decided by who holds the bridge, or seizes the bridge,

Stephen E. Ambrose<sup>1</sup>

## PENGENALAN

Operasi jambatan (*bridging operations*) begitu sinonim dengan askar Jurutera. Para Sapper dituntut untuk mampu membina jambatan gantian atau rakit-rakit di zon pertempuran bagi menggantikan jambatan yang dimusnahkan musuh atau pasukan sendiri. Begitu juga di zon belakang tempur atau di zon *Line of Communication (L of C)*, mereka juga perlu membina jambatan yang mungkin telah dimusnahkan kerana dibom musuh. Di waktu aman pula, aset jambatan tentera juga kerap kali diperlukan oleh pihak awam untuk menggantikan sementara jambatan yang musnah atau rosak akibat bencana alam.

Artikel ini menyentuh sistem aset jambatan tentera. Satu perbincangan tentang keperluan sistem jambatan untuk membantu Tentera Darat (TD) masa kini dan masa akan datang bagi melunaskan misi-misi operasi akan disajikan. Peralatan sedia ada dan peralatan dirancang masuk ke dalam inventori TD serta lain-lain produk dalam kategori yang sama akan dianalisis kemampuan dan limitasinya. Langkah mempertingkatkan kemampuan operasi jambatan TD akan turut disentuh.

## IMBASAN OPERASI JAMBATAN

Peri mustahak misi-misi pembinaan jambatan sewaktu perang tidak memerlukan justifikasi. Dalam tahun 1947, Field Marshal Montgomery pernah menulis, "... bailey bridging made an immense contribution towards final victory in World War II. As far as my operations were concerned, with 8<sup>th</sup> Army in Italy and with the 21<sup>st</sup> Army Group in NW Europe, I could never have maintained the speed and tempo of forward movement without large supplies of bailey bridging...."<sup>2</sup>. Jambatan bailey<sup>3</sup> telah dinobatkan kerana jambatan ini merupakan satu-satunya jambatan peralatan<sup>4</sup> yang ada dalam inventori perang ketika itu. Setelah lebih 5 dekad, pelbagai jenis jambatan baru telah dicipta-reka dan apa yang menarik, perkara asas dan prinsip bailey telah melahirkan produk versi baru yang lebih robust dan versatil.

Selepas Peperangan Dunia Ke-2, operasi jambatan yang tersohor berlaku di Balkan dan

<sup>3</sup> Jambatan ini direka oleh Sir Donald Coleman Bailey (1901-1985) dalam tahun 1940. Produksi bermula pada Jul 1941 dan dibekalkan kepada terup pada Dis 1941. Sepanjang *Italian Campaign* (1943-1945) sahaja, sebanyak 2,500 buah jambatan telah dibina dan 1,500 buah dibina semasa gerak mara ke Eropah mulai tahun 1944 sehingga tamatnya Peperangan Dunia Ke-2.

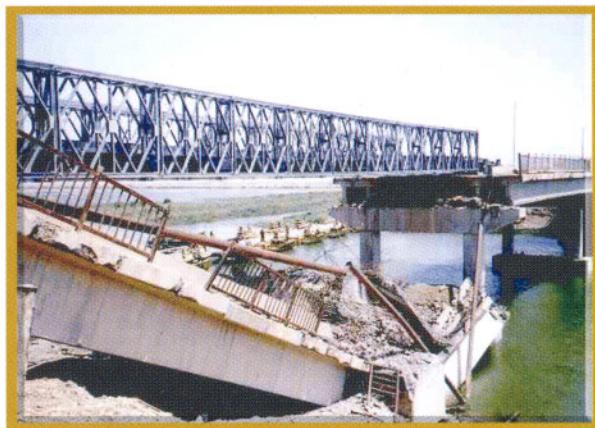
<sup>4</sup> Jambatan Peralatan (*equipment bridge*) adalah istilah yang digunakan untuk menerangkan sistem jambatan standard di pasaran. Jambatan ini lazimnya direka dengan sifat-sifat: - (1) mudah ditransportasi, (2) mudah dibina, dan (3) mudah dibuka dan dibina semula. Jambatan Peralatan adalah berbeza sama sekali dengan Jambatan Rekaan (*Improvised Bridge*) atau *Non-standard Bridge*, istilah yang digunakan untuk menerangkan tentang jambatan yang dibina untuk jurang tertentu menggunakan material sedia ada seperti kayu, *log*, *steel girder*, dll).

<sup>1</sup> Ambrose, Stephen, *Pegasus Bridge*, Simon & Schuster Inc., New York, p. 10.

<sup>2</sup> Hamilton Nigel (1986), *Monty, The Field Marshall (1944-1976)*, Hambat Hamilton, London, p. 76.

dalam OPERATION IRAQI FREEDOM. Kesulitan menyeberangi Sungai Sava berdekatan Zupanja, Croatia pada 31 Dis 1995 telah mendapat liputan besar di dada akhbar seluruh dunia. Operasi menyeberangi Sungai Sava selebar 600 meter yang diklasifikasikan sebagai operasi jambatan di zon L of C telah melakar sejarah sebagai operasi jambatan terbesar semenjak Perang Dunia Ke-2<sup>5</sup>.

Di Iraq tidak kurang gahnya. Operasi menyeberangi jurang yang agak klasik adalah operasi di Sungai Tigris, Sungai Euphrates dan Saddam Canal<sup>6</sup>. Jambatan pontun jenis *ribbon*<sup>7</sup> telah dibina di zon belakang tempur dan jambatan *Medium Girder Bridge* (MGB) pula dibina merentasi struktur binaan jambatan konkrit yang terputus dan musnah<sup>8</sup>. Kenderaan *Armored Vehicle Launched Bridge* (AVLB) pula diaturgerak merentasi batang-batang saluran paip minyak di laluan-laluan kritikal kenderaan tentera<sup>9</sup>. Jelasnya, misi-misi jambatan di Balkan dan Iraq membentarkan kenyataan bahawa keupayaan pembinaan jambatan tentera merupakan faktor kritikal dalam mencapai misi operasi. Ini terus mengesahkan bahawa jambatan merupakan *enabler* utama di masa depan guna melancarkan pergerakan pasukan sendiri di medan pertempuran darat.



**OPERATION IRAQI FREEDOM**  
Jambatan Compact Bailey merentangi Sg Tigris, Iraq yang dibina Tentera Bersekutu

Di Malaysia pula, misi-misi pembinaan jambatan oleh pihak tentera melakarkan sejarahnya yang tersendiri. Dalam EX FIRST STRIKE 1/2006, pasukan Skn Jambatan RAJD telah berjaya membina secara nyata sebuah jambatan pontun yang terpanjang pernah dibina dalam eksesais mahupun dalam operasi TD. Pembinaan jambatan pontun sepanjang 127 m merentangi Sg Berang, Terengganu telah mengambil masa lebih kurang 16 jam (4 jam siang dan 12 jam malam). Sungguhpun begitu, kejayaan ini tidak sama sekali memadamkan rekod kejayaan paling klasik dan nostalgik, yakni semasa tragedi banjir besar tahun 1971. Ketika itu, kehebatan para Sapper terserlah apabila mampu membina sebuah jambatan bailey sepanjang 313 kaki (lebih kurang 100 m) merentasi Sungai Pahang bagi menggantikan jambatan asal yang roboh akibat banjir.

## SISTEM JAMBATAN TD

Keperluan satu-satu sistem jambatan TD wajib menjurus kepada peranan yang dimainkan oleh



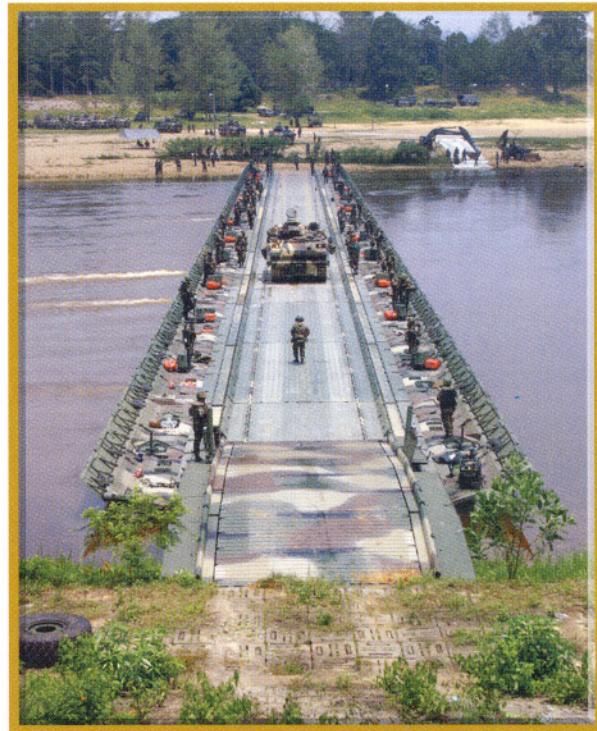
**OPERATION IRAQI FREEDOM**  
Jambatan US Ribbon Bridge di Sungai Sava, Zupanja, Croatia pada 31 Dis 1995

<sup>5</sup> Maj David L. Treleaven, "Engineers in Bosnia: An Overview," US Army Engineer School Publications Production Division, Mac 1996.

<sup>6</sup> Lt Col Ed Jackson, "A Multifunctional Engineer Battalion," *Engineering The Professional Bulletin of Army Engineers* Vol 34 (Jan – Mac 2004), pp. 43.

<sup>7</sup> Fulvio Bianchi, "Assault Bridges and Bridgelayers," *Military Technology - MILTECH* (3-4/2004), p. 81.

TD. Bagi TD Malaysia misalnya, TD berperanan "... memberi bantuan ketumbukan darat untuk mempertahankan kedaulatan Malaysia. Walau bagaimanapun, TD juga dipertanggungjawab dalam tugas-tugas sekunder dan berperanan tambahan semasa aman, konflik dan semasa perang .... Sewaktu aman, TD akan membantu pihak berkuasa awam semasa kecemasan/bencana alam dan projek-projek pembangunan negara"<sup>10</sup>. Berdasarkan peranan ini, RAJD sebagai sebuah pasukan bantuan tempur TD telah dipiagam untuk berperanan yang sama, dengan dipertanggungjawabkan dalam tugas utama, "membantu TD untuk bertempur, bergerak dan hidup"<sup>11</sup>. Sewaktu aman pula, RAJD diberi tugasan sekunder yang tidak kurang penting untuk membantu dalam pembangunan negara serta "membantu pihak kuasa awam [semasa darurat dan bencana alam] dalam memulihkan perkhidmatan-perkhidmatan penting"<sup>12</sup>. Berasaskan kepada peranan-peranan tersebut, dapatlah dirumuskan bahawa keperluan peralatan memfokuskan kepada dua misi teras, iaitu **mempertahankan daratan Malaysia, dan membantu pihak berkuasa awam semasa darurat dan bencana alam**. Justeru, mengambil petunjuk akan dua misi teras ini, sistem jambatan yang sesuai untuk TD mudah dikenal pasti.



*EKS FIRST STRIKE 1/2006 - Jambatan pontun TFB yang dibina oleh 4 Skn RAJD (Jbn) di Sg Berang, Terengganu*



*EKS FIRST STRIKE 1/2006 - Jambatan pontun TFB dalam proses pembinaan*

<sup>10</sup> Army Manual, *The Army (M1 TD), The Army in Military Operation*, Malaysian Army Training Command, Kuala Lumpur, 2004, p. 4-1.

<sup>11</sup> Army Manual, *Royal Engineers Regiment (MP 4.1.1)*, Malaysian Army Training Command, Kuala Lumpur, 2006 (Provisional), p. 1-1.

<sup>12</sup> Army Manual, *Royal Engineers Regiment (MP 4.1.1)*, p. 1-2.

Dalam menunjang teras kedua, misi bantuan kepada pihak berkuasa awam; TD juga haruslah bersedia untuk membantu dalam bencana alam seperti tebing/tanah runtuh, banjir dan lain-lain. Sebagai contoh, jambatan sedia ada di sepanjang lebuh raya Malaysia merupakan infrastruktur kritikal. Ketika bencana, pihak tentera mesti mampu membuka-semula laluan sekiranya jambatan ditutup atas sebab-sebab semula jadi atau gangguan manusia/musuh. Ketika berkenaan, dengan aset yang dipegangnya, pihak tentera boleh menghubungkan kembali jurang yang terputus supaya boleh direntas oleh kenderaan dan orang awam. Bantuan seumpama ini perlu disiapkan secepat yang boleh dan kadang kala peralatan yang dibina akan digunakan dalam waktu yang sedikit panjang<sup>13</sup>. Bagi membolehkan bantuan yang seumpamanya diberikan, sebaik-baiknya aset jambatan tentera boleh diaturgerak ke lokasi kejadian dengan pantas. Pentingnya, aset tentera boleh dijadikan galang-ganti mengantikan

<sup>13</sup> Captain Kevin A. Brooks, "Bridging Shortfall: Lines of Communication Bridging," US Army Engineer School Publications Production Division, March 1999, p. 56.

sementara infrastruktur kritikal seperti jambatan, atau jejambat yang musnah. Oleh itu, peralatan yang boleh mengaplikasikan keperluan pihak awam merupakan satu kelebihan apabila negara berhadapan dengan musibah atau bencana alam.

## KATEGORI DAN JENIS JAMBATAN

Doktrin menyeberangi jurang berair/lurah kering bagi sesebuah angkatan tentera mengklasifikasikan tiga kategori jambatan dalam inventornya. Setiap kategori jambatan dicipta-reka untuk diaturgerak bagi tugas-tugas menyeberang yang spesifik. Kategori peralatan yang dimaksudkan adalah: - (1) jambatan tempur, (2) jambatan bantuan am (*General Support Bridge – GSB*) atau juga popular dengan panggilan jambatan taktikal, dan (3) jambatan logistik (*logistic bridge*). Dengan menilai pasaran serta mengkaji-banding peralatan yang digunakan oleh TD masa kini; serta disokong doktrin TD<sup>14</sup>, ini akan membolehkan TD mengenal pasti aset untuk memperkasa operasi jambatan TD.

### Jambatan Tempur

Jambatan tempur merupakan jambatan barisan pertama yang didedikasikan kepada pasukan armor dan jurutera bagi mengekalkan mobiliti formasi. Kenderaan AVL<sup>15</sup> untuk Kor Armor dan *bridge-layer*<sup>16</sup> inventori pasukan Jurutera termasuk dalam kategori jambatan ini. Aset AVL<sup>17</sup> atau *bridge-layer* boleh membantu eselon tempur dengan efisien di zon pertempuran. Jambatan tempur berkapasiti MLC 60<sup>17</sup> dan boleh dilancar dan siap dalam masa 5 minit. Panjang maksimumnya tidak melebihi 20 m. AVL<sup>18</sup> dan *bridge-layer* menawarkan *rapid armored*

<sup>14</sup> Ketika ini TDM baru mengorak langkah untuk membangunkan Doktrin *River Crossing Operation*. Untuk tujuan latihan, RAJD telah membangun sebuah pamflet 'Jurutera Dalam Operasi Menyeberang Sungai (Sementara)' yang dikeluarkan oleh MK Pem RAJD PMTD Tahun 2006.

<sup>15</sup> Mengikut 'doktrin TD', AVL<sup>19</sup> diinventorikan kepada Rejimen Armor DiRaja.

<sup>16</sup> Perbezaan ketara antara AVL<sup>20</sup> yang dipegang oleh Kor Armor dan *bridge-layer* yang dalam inventori Kor Jurutera adalah terhadap *platform*. AVL<sup>21</sup> dibawa atas kenderaan beruntut, manakala *bridge-layer* dibawa atas kenderaan beroda.

<sup>17</sup> MLC merujuk kepada berat *tonnage* yang selamat ditanggung oleh jambatan dalam satu jangka masa yang sesuai. MLC 30 bermaksud kenderaan yang mempunyai berat sehingga 30 tons boleh merentasi jambatan tersebut.



AVLB di atas chassis kereta kebal Leopard



AVLB sedang dilancarkan

*bridging capability* untuk membantu kereta kebal dan kenderaan berantai bergerak semasa tahap serangan atau dalam misi mara untuk bertempur.

### Jambatan Bantuan Am/Jambatan Taktikal

GSB/Jambatan Taktikal lazimnya digunakan untuk pembinaan jambatan separuh kekal atau pembinaan kekal, di mana pergerakan kenderaan yang akan menyeberangnya adalah dirancang. Jambatan kategori ini selalunya dibina di tempat yang mempunyai rangkaian jalan yang sibuk bagi kegunaan kenderaan berantai dan beroda. Jambatan ini lazimnya ringan, mudah diangkut di atas kenderaan pengangkut yang didedikasikan kepadanya (*own-dedicated vehicle*). Jambatan ini boleh dibina dengan pantas menggunakan tangan dan dengan bantuan peralatan mekanikal yang minimum. Jambatan dalam kategori ini yang dipegang oleh TD adalah *single-span bridge* dan *floating bridge*.

**Tactical Single-span Bridge (TSSB)**<sup>18</sup> direka untuk digunakan di zon pertempuran. Jambatan ini sesuai digunakan untuk merentangi jurang berair atau kering. Semasa aman pula, jambatan ini juga boleh digunakan untuk jurang yang tidak melebihi 50 m di laluan perhubungan jalan raya awam yang terputus disebabkan oleh bencana alam<sup>19</sup>; sementara menunggu jambatan logistik atau jambatan yang lebih sesuai siap dibina oleh Jabatan Kerja Raya (JKR) atau agensi-agensi kerajaan yang lain.

Sejenis lagi jambatan dalam inventori TD adalah **tactical floating bridge (TFB)**<sup>20</sup>. Jambatan *Pont Flottant Motorise* (PFM) buatan Perancis termasuk dalam kategori jambatan ini ia merupakan jambatan dwi-fungsi (jambatan dan rakit)<sup>21</sup>. Jambatan PFM ini menggunakan sistem *folding pontoon* yang boleh disambung untuk digunakan sebagai jambatan terapung (*floating bridge*)<sup>22</sup> atau sebagai rakit/feri<sup>23</sup>. Jambatan ini memiliki ciri-ciri yang lebih baik dari segi kos, ketahanan dan kos senggara yang rendah. Jambatan ini sesuai digunakan untuk merentasi lurah berair sahaja dengan kelebaran hingga 100 m/set atau jika kelebarannya melebihi 100 m, satu set aset ini boleh dijadikan 3 buah rakit tempur kelas berat (MLC 90). Pun begitu, sekiranya modul-modul tambahan boleh diadakan, panjang jambatan yang



Jambatan TSSB dari keluaran Bridge for Nineties (BR 90)

boleh dibina adalah tidak terhad dengan syarat tali penahanan (*anchorage*) perlu dipasang. Jambatan sepanjang 600 m yang dibina di Sungai Sava, Zupanja, Croatia pada 31 Dis 1995 merupakan contoh jambatan jenis ini.

Jambatan lain dalam kelompok yang sama adalah **MGB**<sup>24</sup>. Panjang standard sebuah set MGB adalah 45.7 m, dan 4 m lebar. Konfigurasi biasa menawarkan muatan berkapasiti MLC 60 merentangi jurang 30 m dengan masa pembinaan selama 2 jam oleh sebuah Tp Jurutera. Dengan pemasangan *link reinforcement* atau pemasangan *portable pier*, jambatan ini boleh disiapkan dalam waktu 4 jam. MGB telah diberi-nafas baru dengan diperlengkap dengan peralatan mekanikal *MACH set*<sup>25</sup>. Sebahagian angkatan tentera telah mengklasifikasi semula aset MGB sebagai jambatan logistik<sup>26</sup>. Pun begitu, tidak menjadi 'kesalahan' atau satu kekhilafan doktrin jika MGB diatur gerak di zon pertempuran dan digunakan sebagai jambatan GSB.

<sup>18</sup> Jambatan BR 90 (*bridging for nineties*) termasuk dalam kategori TSSB. BR 90 disebut-sebut sebagai satu keluaran peralatan menyeberang terkini yang dihasilkan oleh UK. Jambatan BR 90-single span boleh dibina sepanjang 52 meter pada keupayaan MLC 70. Setiap set jambatan boleh digunakan untuk pembinaan salah satu konfigurasi jambatan sepanjang :-(1) 16 m, atau (2) 32 m, atau (3) 38 m, atau (4) 44 m atau (5) 52 m. (Rujuk Pamflet Jurutera Dalam Operasi Menyeberang Sungai (*Sementara*), MK Pem RAJD PMTD Tahun 2006).

<sup>19</sup> Sebuah jambatan TSSB sepanjang lebih kurang 40 m telah dibina di Kg Tiroi, Seremban pada 4 Jan 2006 bagi menggantikan sementara jambatan konkrit yang musnah sama sekali akibat banjir. Ia dibina oleh pasukan 4 Skn RAJD (Jn), Kluang dan dibantu 9 Skn RAJD, Kem Terendak.

<sup>20</sup> Setiap set jambatan PFM 100 m panjang mengandungi komponen asas berikut:- (1) 3 x Standard PFM floating pontoons, (2) 2 x Standard PFM access ramps, (3) 6 x PFM SIR floating pontoons, dan (4) 11 x semi-trailer (transporters). (Rujuk Pamflet Jurutera Dalam Operasi Menyeberang Sungai (*Sementara*), MK Pem RAJD PMTD Tahun 2006).

<sup>21</sup> Setiap set PFM SIR 100 m panjang boleh dibentuk menjadi salah satu produk berikut:- (1) 3 x Rakit (MLC 90), atau (2) 2 x floating bridge (MLC 60) 50 m panjang, atau (3) 1 x floating bridge (MLC 70) 100 m panjang. (Rujuk Pamflet Jurutera Dalam Operasi Menyeberang Sungai (*Sementara*), MK Pem RAJD PMTD Tahun 2006).

<sup>22</sup> Kemampuan Jambatan – Kelas/ciri-ciri kenderaan yang boleh melalui jambatan adalah: - (1) MLC 70, (2) Kelajuan maksimum kenderaan: 25 km/j untuk kenderaan < 30, (3) Kelajuan minimum: 15 km/j untuk kenderaan > 30, (4) Kederasan arus air: 2.5 m/s, dan (5) Kemampuan trafik - 250 kenderaan sejam. (Rujuk Pamflet Jurutera Dalam Operasi Menyeberang Sungai (*Sementara*), MK Pem RAJD PMTD Tahun 2006).

<sup>23</sup> Kemampuan Feri:- (1) Jenis feri adalah 2 + 2, 3 + 2, 4 + 2, 5 + 2, (2) Kelajuan maksimum feri 4 + 2 dengan kelas muatan-60 dan kedalaman air > 4 m adalah 2.80 m/s, dan (3) Kelasakan feri dengan kapasiti 24-liter fuel tank, adalah > 1 jam. (Rujuk Pamflet Jurutera Dalam Operasi Menyeberang Sungai (*Sementara*), MK Pem RAJD PMTD Tahun 2006).

<sup>24</sup> MGB telah diinventorikan kepada RAJD pada penghujung tahun 70'an.

<sup>25</sup> Sistem MACH membolehkan MGB dibina oleh kekuatan sumber manusia yang minimum tanpa menambah masa pembinaan menggunakan kren. Pemasangan *link reinforcement* mampu meningkatkan MLC jambatan sepanjang 45.7m kepada MLC 60. *Reduced slope ramp* membolehkan kenderaan awam merentasi jambatan MGB.

<sup>26</sup> Bentuk rupa MGB adalah sama dengan TSSB/BR 90s. TSSB dikatakan hasil klonan MGB. Perbezaan ketara cuma terhadap kekuatan tenaga kerja pembinaan. TSSB hanya memerlukan seperempat tenaga kerja berbanding tenaga kerja MGB. Masa yang diambil untuk pembinaan juga amat pantas.



Medium Girder Bridge (MGB) yang diinventorikan kepada RAJD pada tahun 70an. Kini jambatan ini telah ditamatkan perkhidmatan

### Jambatan Logistik

Jambatan logistik jauh berbeza berbanding dua kategori jambatan yang dibincang awal. Berdasarkan doktrin, jambatan logistik dibina di zon *L of C*. Biasanya, jambatan di *L of C* bersifat kekal. Jambatan ini menawarkan *MLC* yang lebih besar dan akan digunakan lebih lama di satu-satu tempat. Jambatan ***Extra Wide Bailey Bridge, Compact Bailey*** dan ***ACROW Penal Bridge*** merupakan tiga versi yang dipertingkatkan daripada jambatan bailey asal. Sebuah jambatan standard mempunyai *MLC* 60 dengan rentang (span) sepanjang 48 m dan lebarnya 4.24 m.

### ANALISIS KAPABILITI DAN LIMITASI

Dalam mengenal pasti aset jambatan sementara kontemporari dan sesuai bagi TD, sifat-sifat asas sesuatu aset jambatan itu perlu menepati keperluan operasi ketenteraan, dan boleh digunakan semasa menghadapi bencana alam. Untuk kemaraan tentera, sifat-sifat peralatan yang diinventorikan perlulah *robust* diaturgerak ke kawasan yang diperlukan. Oleh demikian, aset jambatan yang boleh dipencarkan di seluruh pelosok negara dan produk bercirikan *highly mobile* serta lasak digerakkan di seluruh jajaran jalan raya di seluruh Malaysia perlu menjadi pilihan.

AVLB/*Bridge-layer* merupakan peralatan menyeberang yang baik. Walaupun begitu,

jambatan ini kurang sesuai untuk dilalui kenderaan jenis beroda kerana kedua-dua jenis jambatan ini tidak mempunyai panel lantai dan kurang kuasa cengkaman. Kekurangan ini menghadkan ia digunakan oleh kenderaan awam<sup>27</sup> kerana amat merbahaya. Satu lagi kelemahan jambatan jenis ini, sebaik dilancarkan; jambatan ini akan kekal di lokasi pembinaannya sehingga semua kenderaan melintasinya atau jambatan bantuan/jambatan logistik siap dibina; ataupun tempat menyeberang yang lain telah dibina. AVLB dan *bridge-layer* masih merupakan sistem jambatan yang cepat dibina di medan.

Jambatan *GSB/Taktikal* pula merupakan jambatan yang begitu popular dalam inventori mana-mana angkatan tentera. Jambatan kategori ini diinventorikan kepada Kor Jurutera. Melihat kepada bentuk rupa serta kemampuan jambatan, ia paling sesuai digunakan dalam tugas tempur mahupun diaturgerakan bagi kegunaan pihak awam. Kebaikannya, boleh memenuhi kedua-dua teras peranan TD, dan kedua-dua jambatan *TSSB* dan *TFB* yang dipegang oleh TD ketika ini boleh dikongsi-guna oleh pihak

<sup>27</sup> Jambatan AVLB/*bridge-layer* tidak direka untuk kegunaan awam dan tidak mempunyai value dalam membantu pihak berkuasa awam. Bentuk-rupa dan keupayaan aset ini hanya khusus untuk satu fungsi, yakni untuk tujuan digunakan di medan tempur. Walaupun tidak dinafikan, dalam situasi gawat ia masih boleh dideploy untuk merentangi jurang selebar 20 m dan kurang, ketiadaan komponen lantai menyebabkan ia tidak selamat dan tidak digalakkan untuk digunakan oleh pihak awam. (Sementara) yang dikeluarkan oleh MK Pem RAJD PMTD Tahun 2006.

awam dengan efektif. Menyentuh tentang jambatan *MGB* yang juga di dalam kategori *GSB*, TD pernah menginventori jambatan ini selama lebih suku abad. Dengan perolehan jambatan *TSSB* dan *PFM*, jambatan *MGB* telah ditamatkan perkhidmatan. Walaupun jambatan ini hanya mampu merentangi jurang selebar 46 m, *MGB* masih menduduki carta popular jambatan TD masa kini. Berdasarkan klasifikasi jambatan serta kemampuan yang boleh ditawarkan oleh aset ini, *MGB* juga sesuai memikul dua teras utama peranan TD/RAJD.

*MGB* mungkin tidak sebaik jambatan *TSSB* atau *TFB*. Ini memerlukan sumber manusia yang intensif, biasanya sekumpulan terup Jurutera. Namun, sistem *MACH* membolehkan produk perkhidmatan disiapkan dalam masa yang relatif sama dengan hanya satu seksyen anggota dibantu sebuah kren. Hasil inovasi produk, kini *MGB* telah menawarkan pengguna dengan pilihan tambahan. Berbekalkan *floating pontoon* yang boleh bertindak sebagai ‘*intermediate support*’, jambatan yang lebih panjang boleh dibina. Kelebihannya, *MGB* sekarang boleh juga berfungsi sebagai produk ‘2 dalam 1’, iaitu sebagai jambatan mahupun rakit. Jambatan yang dikenali *medium floating bridge* (*MFB*)<sup>28</sup> boleh dibina lebih panjang dengan menambah pontun daripada set *MFB* yang lain. Apa pun, *TFB* yang dipegang oleh TD sekarang dilihat sebagai produk dwi-fungsi yang paling baik dalam pasaran masa ini berbanding *MFB*.

Jambatan yang kurang diberi perhatian adalah jambatan logistik. Antara sebab fenomena ini adalah kerana TD merasakan jambatan *TFB* dan *TSSB* sudah memadai. Sebenarnya, jambatan yang juga dipanggil *panel bridging* ini merupakan aset yang paling baik dan amat sesuai untuk tugas ketenteraan dan tugas-tugas membantu pihak berkuasa awam. Reka bentuk dan aplikasinya menjurus kepada kegunaan awam. Masa pembinaannya adalah berganda panjang berbanding *TSSB* dan *MGB*. Walaupun lebih sukar dan memakan masa pembinaan, *panel bridge* mampu merentangi kebanyakan jurang di Malaysia<sup>29</sup>. Jasa *panel bridging* di

Malaysia amat besar. Antaranya, pembinaan Jambatan Bailey sepanjang 313 kaki (lebih kurang 100 m) di Temerloh dalam tahun 1970<sup>30</sup>, dan Jambatan Bailey di Silibukan, Sabah sepanjang 90 m dalam tahun 1972<sup>31</sup> merupakan pengalaman nostalgik yang terpahat dalam tinta sejarah TD. Sehingga kini, RAJD sering dipanggil oleh pihak berkuasa awam untuk membantu membina jambatan logistik khususnya semasa banjir. Malangnya, RAJD hanya memegang jambatan logistik dalam ‘kuantiti skala latihan’ sahaja. Disebabkan RAJD mempunyai kepakaran yang tinggi, pihak JKR telah memberi kepercayaan dengan meminjamkan jambatan baileynya semasa banjir kepada RAJD<sup>32</sup>. Sumbangan RAJD telah mendapat sanjungan tinggi oleh ramai pemimpin negara dan pihak istana.

## MEMPERTINGKAT KEMAMPUAN OPERASI JAMBATAN

Ekoran program mentransformasikan TD, kemampuan operasi berjambatan perlu turut mengalami perubahan. Bagi mendukung ciri-ciri *strategic mobility* yang ingin diterapkan dalam tubuh badan TD, aset-aset TD haruslah mudah ‘dipasang-tanggal’ dan boleh diangkut untuk dimuatkan menggunakan kapal atau diterbangkan ke kawasan operasi. Untuk kekal *tactically decisive*, TD perlulah dibekalkan dengan aset dalam peratusan siaga yang ditetapkan oleh TD. Oleh itu, sesuatu sistem jambatan, atau kombinasi sistem jambatan yang diperlukan oleh TD perlu boleh memenuhi keperluan berikut:- (1) sistem yang fleksibel semasa merespon sesuatu misi, (2) seboleh-bolehnya, komponennya boleh digunakan untuk mengganti bahagian-bahagian jambatan peralatan pegangan pihak awam, dan dalam masa yang sama, (3) memenuhi spesifikasi tentera.

<sup>30</sup> Pembinaan diselia oleh Major J A Coomb RE, Peg Pem 1 Skn RAJD. Pembinaan memakan masa selama 5 hari. Rujuk Artikel “Pengkisahan Jambatan Bailey”. Sapper – Majalah Rasmi RAJD Bil 3, Tahun 1998, p. 68.

<sup>31</sup> Jambatan ini dibina oleh pasukan 2 Skn RAJD. Rujuk Artikel “Pengkisahan Jambatan Bailey”. Sapper – Majalah Rasmi RAJD Bil 3, Tahun 1998, p. 68.

<sup>32</sup> Pasukan 8 Skn RAJD, Kluang, Johor telah membina 3 buah jambatan bailey semasa banjir di selatan tanah air. Butir-butir pembinaan adalah seperti berikut: - (1) Pembinaan Jambatan Bailey (kepunyaan RAJD) sepanjang 27 m di Blt 4, Jln Mersing, Johor pada 13 Jan 07, (2) Pembinaan Jambatan Bailey (kepunyaan JKR) sepanjang 84 m di Ulu Pengeli, Kluang, Johor pada 23 Jan 2007, dan (3) Pembinaan Jambatan Compact Bailey (kepunyaan RAJD) di Felda Selancar 1, Rompin, Pahang pada 22 Dis 2006.

<sup>28</sup> Satu set *Medium Floating Bridge* (*MFB*) boleh dijadikan 2 buah rakit berat atau sebuah jambatan sepanjang 85 m.

<sup>29</sup> Berdasarkan statistik jurang/jambatan, 75 % daripadanya berukuran di antara 15 m sehingga 50 m, manakala bakinya berukuran melebihi 50 m.

Dalam mempertimbangkan jenis dan keperluan jambatan untuk mendukung dua peranan teras yang dinyatakan, ketiga-tiga kategori jambatan yang dibincangkan amat menepati dan relevan untuk memperkasa TD. Di segi perspektif peralatan, *TSSB* dan *MGB* adalah mencukupi untuk digunakan merentangi jurang manakala *PFM* pula merupakan produk dwi-fungsi yang amat baik untuk jurang berair yang agak lebar. Kedua-dua sistem *GSB* bagi TD ketika ini boleh diklasifikasikan sebagai produk tercanggih di pasaran masa kini.

Berdasarkan analisis di atas, keutamaan perolehan aset jambatan TD wajar ditumpukan kepada jambatan *GSB* dan jambatan logistik. Selain ampuh di medan tempur, aset-aset ini boleh digunakan dalam membantu pihak berkuasa awam. Walaupun begitu, kuantiti/skala dalam inventori TD dan penempatannya perlu dikaji-ulang (re-visited) supaya aset jambatan tentera yang mahal harganya boleh ‘dikrimati’ bersama oleh rakyat. Perolehan jambatan *Extra-wide bailey bridge*, *Compact Bailey* atau *ACROW Panel Bridge* tidak bijak ditangguhkan atau diketepikan. Aset *TSSB/BR90*, *TFB* dan panel bridging wajar menjadi kemampuan teras (*core capability*) operasi jambatan pasukan Jurutera.

## PENUTUP

Kemampuan sesuatu sistem jambatan tentera perlu sesuai dengan keperluan tugas serta peranan TD. Doktrin operasi jambatan tidak hanya wajar berlandaskan kepada kegunaan peralatan untuk bertempur semata-mata, malah perlu diperluaskan ruang lingkupnya. Jambatan *TSSB* dan *TFB* yang telah diinventorikan kepada TD dan jambatan logistik yang didamkan oleh RAJD merupakan pilihan bijak dan bakal memperkasa kemampuan operasi jambatan TD dan apa yang lebih penting, ia memberi kemanfaatan kepada pihak berkuasa awam.

Analisis yang ditawarkan memperlihatkan bahawa TD sedang berada di landasannya. Walaupun begitu, untuk memperkasa operasi jambatan TD, kuantiti/skala peralatan TD perlu kajian lanjut. Langkah seterusnya adalah untuk memberi keutamaan terhadap perolehan aset jambatan logistik. Negara tidak akan rugi seandainya ATM mempunyai aset-aset jambatan yang banyak kerana akhirnya aset ini akan dikongsi-guna untuk rakyat Malaysia.

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# MARKSMAN SASARAN TENTERA DARAT MALAYSIA



Oleh Mej Christopher Ignetus Choong

## PENDAHULUAN

Konsep *Marksman* yang ingin diterapkan ini adalah sebahagian daripada budaya sesebuah organisasi dan ditujukan untuk meningkatkan keupayaan Tentera Darat untuk menjadi sebuah organisasi yang berkesan dan cekap. Konsep ini adalah idea Yang Berbahagia Panglima Tentera Darat, Jen Tan Sri Dato Sri' Abdul Aziz Zainal di dalam bukunya, "Marksman, A Target for the Malaysian Army."<sup>1</sup> Idea konsep ini adalah untuk menyuburkan semula nilai-nilai utama Tentera Darat dan pelaksanaannya di dalam tugas harian seseorang individu dan juga organisasi. Konsep *Marksman* pada keseluruhannya adalah untuk membina individu-individu untuk menjadi anggota tentera yang profesional yang mana seterusnya akan membangunkan organisasinya dan membawa kegemilangan kepada Tentera Darat amnya.

Budaya *Marksman* adalah bertujuan untuk menyuburkan semula nilai-nilai utama Tentera Darat Malaysia dan pelaksanaannya di dalam tugas harian seseorang individu serta organisasi. Perlu difahami bahawa budaya *Marksman* terjadi dari profesionalisma ketenteraan individu dan ini akan secara tidak langsung membawa kepada organisasi *Marksman*. Proses pertukaran untuk menjadi "organisasi *Marksman*" tidak boleh dilakukan secara mendadak, tetapi ia akan menjadi pemangkin kepada pencapaian kecekapan menerusi satu proses sistematik dan dinamik.

## TUJUAN

Tujuan ulasan buku ini adalah untuk mendedahkan konsep *Marksman* sebagai teras kepada pengurusan harian TD pada masa kini.

<sup>1</sup> Jen Tan Sri Dato' Sri Abdul Aziz Zainal, Marksman, A Target for the Malaysian Army, National Library Malaysia, 2006.

## SKOP

Ulasan buku ini akan meliputi perkara-perkara berikut:

- Definisi.
- Proses.
- Ciri-ciri.
- Prinsip-prinsip.
- Implimentasi Rancangan.
- Pendekatan Pengurusan.

## DEFINISI

*Marksman* adalah istilah yang biasa digunakan di dalam konteks tentera, yang mana bermaksud seorang anggota tentera yang terlatih untuk menembak dengan tepat menggunakan senjata. Tentera Darat Malaysia menggunakan istilah *Marksman* sebagai merujuk kepada menghasilkan seorang soldadu yang telah mencapai tahap profesionalisma ketenteraan dan individu yang tinggi. Untuk itu ia mesti diterapkan sebagai sebahagian budaya organisasi dan ditujukan untuk meningkatkan keupayaan Tentera Darat untuk menjadi sebuah organisasi yang berkesan dan cekap. Organisasi yang berkesan dan cekap bermula dengan sumber manusia, yang mana merupakan aset terpenting sesebuah organisasi. Tentera Darat Malaysia ingin melihat *Marksman* dari sudut pandangan yang lebih luas, bukan sahaja merujuk kepada soldadu-soldadu yang mahir mengendalikan senjata tetapi juga pakar melaksanakan fungsi dan ketukangan mereka masing-masing.

"Apakah itu budaya *Marksman*?" Secara amnya, budaya adalah cara orang perseorangan melakukan sesuatu di dalam sebuah organisasi. Ia merangkumi kepercayaan, nilai-nilai utama, sikap dan cara orang perseorangan berkelakuan di dalam sebuah organisasi. Ini adalah elemen-elemen yang mempengaruhi pelaksanaan sebuah organisasi dan penentu sama ada organisasi tersebut akan masih wujud semasa berhadapan dengan perubahan, keadaan huru-hara dan cabaran persekitaran. Di dalam era globalisasi dan masyarakat tanpa batasan, adalah menjadi penting untuk menilai persekitaran yang kian mencabar dan membangunkan semula satu strategi untuk menggalakkan kecekapan modal insan di dalam organisasi untuk menyesuaikan diri kepada perubahan tersebut. Pada masa yang sama, pelaksanaan tugas yang unggul di dalam organisasi oleh orang perseorangan akan menyumbang kepada keberkesanan organisasi tersebut. Oleh sebab itulah budaya *Marksman* ini diperkenalkan.

## PROSES

Proses ini bermula dengan memberikan pengetahuan, kepakaran dan pengalaman yang diperlukan untuk membentuk setiap individu menjadi seorang anggota tentera profesional. Seorang soldadu dilatih bukan sahaja untuk melaksanakan fungsi utamanya tetapi juga tugas-tugas sekunder yang mempelbagaikan keupayaan mereka. Proses ini tidak terhenti pada tahap *Marksman* individu, ia lebih dari itu, ia berterusan kepada melaksanakan dua tugas utama Tentera Darat Malaysia. Iaitu untuk mempertahankan kedaulatan negara dan kepentingannya daripada ancaman luar dan untuk melindungi masyarakat daripada apa jua ancaman dalam negara. Oleh itu, konsep *Marksman* adalah untuk membina individu-individu untuk menjadi anggota tentera yang profesional yang akan berkhidmat kepada masyarakat dan negara.

Implimentasi budaya *Marksman* bermaksud untuk mencapai perkara-perkara berikut:

- \* Membantu perkembangan rancangan Tentera Darat di dalam mencapai modal insan.
- \* Meningkatkan keutuhan tim di antara

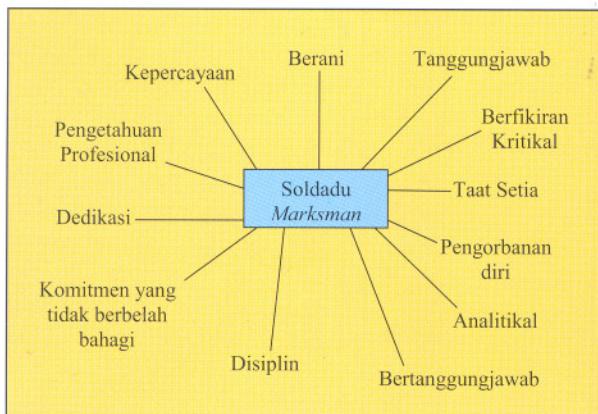
elemen-elemen yang berlainan di dalam organisasi tersebut.

- \* Meningkatkan motivasi di dalam organisasi menerusi perasaan rasa sepasukan, taat setia, kepercayaan dan nilai-nilai serta pada masa yang sama menggalakkan mereka untuk menjadi yakin diri dan proaktif.
- \* Mempengaruhi budaya kerja organisasi tersebut untuk menjadi lebih berkesan dan cekap.
- \* Menyatukan orang perseorangan dan mengoptimumkan potensi mereka supaya mereka mempunyai semangat daya saing.

Soldadu jenis bagaimanakah yang akan menggambarkan sifat-sifat budaya baru ini? Budaya *Marksman* tertumpu kepada teras kecekapan dan pemelbagaiannya secara beransur-ansur di dalam keupayaan untuk melaksanakan fungsi-fungsi tambahan di dalam organisasi. Dengan berbuat demikian, tenaga kerja akan menjadi pelbagai fungsi, membuatkan organisasi menjadi pelbagai operasi. Budaya ini akan mengoptimumkan sumber yang sukar didapati dan menyatupadukan tenaga di dalam semua aktiviti. Ia akan menumpu kepada pengetahuan pengurusan, yang mana adalah merupakan pemangkin utama untuk pembangunan. Alaf baru adalah masa untuk bersekongkol yang memerlukan kerjasama antara orang perseorangan, teknologi dan material. Begitu juga, mengekalkan persekitaran yang aman memerlukan pakatan yang merangkumi pertahanan, diplomasi dan kerjasama keselamatan kepada integrasi antara semua agensi-agensi keselamatan.

## CIRI-CIRI MARKSMAN

Zaman baru ini memerlukan soldadu-soldadu yang berpengetahuan dan mempunyai keupayaan untuk melaksanakan peranan yang pelbagai. Soldadu sekarang ini mengetahui strategi organisasi dan peranan yang dimainkan oleh mereka di dalam mencapainya. Berhadapan dengan persekitaran keselamatan yang berubah secara pesat, soldadu di setiap peringkat adalah dikehendaki mempunyai kualiti yang akan membuatkan mereka analitikal, kritikal dan berfikiran terbuka semasa melaksanakan tugas-tugas.



Faktor-faktor utama yang perlu untuk menerima perubahan-perubahan adalah dengan mengadakan:

- \* Wawasan Untuk Perubahan – Carta untuk menyatupadukan kemajuan individu dan kumpulan.
- \* Memperolehi Sokongan Untuk Perubahan – Mendapatkan komitmen daripada semua peringkat organisasi tersebut untuk menentukan yang perubahan diterima dan dilaksanakan dengan sewajarnya.
- \* Laksanakan Perubahan – Pantau implimentasi dan validasi.

## PRINSIP-PRINSIP MARKSMAN

Seperti juga mana-mana disiplin, *Marksman* telah menetapkan satu set prinsip-prinsip yang akan menunjukkan cara seorang penembak boleh menembak dengan baik. Prinsip yang sama juga boleh dilihat dari sudut pandangan yang lebih luas sebagai peraturan untuk individu dan organisasi menjadi yang terbaik. Secara asasnya, *Marksman* berkembang di sekitar empat faktor utama, iaitu *memegang, melaras, menenang dan menembak*.

### Memegang: Kedudukan dan Pegangan

Di dalam konteks menembak, mengambil kedudukan dan memegang adalah lebih sukar dari memetik picu. Mengambil kedudukan tertumpu kepada bagaimana *Marksman* menempatkan

senjatanya kepada sasaran-sasaran semasa beliau bersedia untuk menembak. Keduanya, ia adalah berkenaan memegang, yang merujuk kepada ketegapan dan ketahanan di dalam mengekalkan posisi dan mengendalikan senjata itu.

Dari sudut pandangan pengurusan, "Kedudukan dan Pegangan" adalah merujuk kepada pencapaian organisasi dari segi kredibiliti dan hubungkaitnya. Ia mesti boleh dapat mengekalkan kedudukan tersebut dengan pegangan yang kuat dengan cara sentiasa dapat berubah mengikut keadaan persekitaran. Dalam hal ini, Tentera Darat Malaysia telah mengukir nama dipersada dunia dengan menewaskan pengganas komunis di dalam negara dan telah meletakkan ia sebagai sebuah angkatan pengaman yang disegani.

Sebagai sebahagian daripada Angkatan Tentera Malaysia, Tentera Darat Malaysia juga telah memainkan peranannya sebagai sebuah angkatan yang dapat mencegah ancaman luar dan ia mesti dapat mengekalkan "kedudukan" ini dan pada masa yang sama "pegang" kepada kredibiliti dengan cara selalu mengubah strateginya untuk sentiasa kekal relevan.

Garis panduan untuk mengekalkan kredibiliti termasuk:

- \* **Struktur Organisasi.** Perlu peka kepada kemunculan cabaran-cabaran keselamatan, Tentera Darat Malaysia telah mengambil langkah-langkah untuk memodenkan struktur organisasinya untuk berhadapan dengan ancaman simetri dan asimetri. Proses ini termasuk pengstrukturkan semula angkatan dan pembangunan keupayaan. Dengan itu, divisyen-divisyen infantri telah ditingkatkan dan di struktur semula sebagai mekanis, bantuan dan pasukan atur tindak cepat. Dalam dunia hari ini, mudah ubah dan keupayaan untuk di atur gerakkan dengan cepat telah menjadi satu keperluan penting.
- \* **Teknologi.** Semenjak Perang Teluk, teknologi untuk bertempur dengan musuh dari jarak jauh telah meningkat dengan pesatnya. Elemen teknologi telah menjadi faktor utama dalam alaf baru ini,

kerana perperangan moden telah mengubah tentera darat dari sebuah angkatan yang bersifat ganas kepada sebuah angkatan yang menggunakan akal fikiran. Maklumat masa benar dan tepat adalah intipati perperangan moden kini. Tentera Darat Malaysia tidak mempunyai teknologi masa terkini tetapi sedang di dalam rangka perancangan. Struktur C4ISR (Pemerintahan, Kawalan, Perhubungan, Perkomputeran, Perisikan, Pengawasan dan Tinjauan) untuk Tentera Darat sedang dirancang untuk memastikan yang ia mempunyai struktur pemerintahan yang boleh dipercayai, selamat dan menyeluruh. Ini akan dihubungkan kepada dua perkhidmatan yang lain iaitu Tentera Laut dan Tentera Udara untuk memastikan Angkatan Tentera Malaysia adalah sebuah angkatan yang kredible dan berkeupayaan.

- \* **Sumber Manusia.** Manusia adalah merupakan senjata utama di dalam perperangan, adalah amat penting sekali iaitu pembangunan sumber manusia sentiasa dikaji semula untuk memberi nafas baru kepada tenaga kerja ini. Seperti yang telah dinyatakan, matlamat utama pembangunan sumber manusia adalah menghasilkan soldado professional yang "berfikir dan analitikal" dengan peranan yang pelbagai.

### Melaras: Larasan Semulajadi

Melaraskan senjata adalah untuk mendapatkan kedudukan peluru di sasaran. Ini adalah penting dan perlu untuk menjadi seorang penembak tepat. Sebagai seorang *Marksman* ia akan terjadi secara semulajadi. Ia mesti boleh mengubah klik pada pejera teropong mengikut kehendak dan kesesuaian sasaran. Langkah ini juga mesti diulangi sehingga peluru mengenai tepat pada sasaran.

Di dalam konteks pengurusan, pelarasan semulajadi adalah sifat semulajadi perperangan di mana Tentera Darat Malaysia telah alami. Ia merujuk kepada keupayaan bertempur di dalam hutan yang mana telah dibentuk semasa Darurat Malaya, ia perlu dihargai dan diperturunkan

kepada generasi yang akan datang. Walaupun teknik bertempur di dalam hutan ini dilihat sebagai sudah ketinggalan zaman, ia telah diubah suai untuk disesuaikan dengan cara pertempuran di kawasan terbina. Persoalan pokoknya adalah Tentera Darat Malaysia telah mengamalkan kemahiran perperangan asimetrik ke dalam keadaan perperangan konvensional untuk mengatasi keperluan untuk teknologi canggih.

### Menenang: Menenang dengan Betul

Mengambil tenangan yang betul selepas mengambil kedudukan dan pegangan yang betul oleh sibenembak tidak akan menjamin tembakkan yang tepat. Ia bergantung kepada faktor-faktor lain seperti angin, keadaan cuaca, cahaya dan yang paling penting sekali aplikasi teknik-teknik yang betul semasa menembak. Angin dan cuaca mempunyai kesan yang mengejutkan semasa menembak di luar, kerana tiupan angin yang konsisten akan memberi kesan kepada pemarkahan. Oleh yang demikian, penembak yang berjaya akan mempelajari metoda untuk mengatasi kesan angin ini.

Menenang dengan betul adalah berhubung dengan perancangan dan mengoptimumkan sumber-sumber. Kebiasaannya organisasi akan menghadapi pelbagai aspek seperti kos, kualiti, perkhidmatan, latihan dan lain-lain secara serentak, dan akhirnya akan melambatkan pencapaiannya. Adalah menjadi fakta nyata bahawa ia merupakan satu tugas sukar untuk dibuat pembaikan pada kesemuanya dalam satu masa, oleh itu mengenal pasti tempat-tempat yang perlu untuk diberi perhatian dan menentukan semua sumber tersebut dioptimumkan. Perkara-perkara utama yang perlu untuk menenang dengan betul adalah dengan menanamkan disiplin yang tinggi dan budaya berkualiti di dalam organisasi tersebut. Antara cara-cara yang dilakukan di dalam Tentera Darat Malaysia adalah:

- \* **Pemusatkan Sumber-sumber:** Adalah menjadi tujuan strategi ulung ini untuk memusatkan elemen-elemen kuasa kombat dan tenaga manusia bagi menumpukan ia ke satu tujuan. Keupayaan digabungkan untuk memperolehi satu

angkatan yang kredible untuk berhadapan dengan suatu keadaan kombat. Semasa Darurat Malaya, Tentera Darat dan Tentera Udara telah melaksanakan operasi bersama untuk menghapuskan pengganas komunis. Begitu juga, negara-negara di rantau ini yang mempunai pakatan pertahanan dan angkatan gabungan untuk menentukan keselamatan.

- \* **Mensasarkan:** Ini bermakna untuk menumpukan ke objektif-objektif yang akan mempunyai kesan secara langsung ke atas peranan Tentera Darat di dalam mempertahankan negara. Idea utama di sini adalah mengatasi kelemahan dengan kekuatan. Oleh kerana Tentera Darat Malaysia terkenal di dalam kejayaannya menentang pengganas komunis, teknik-teknik yang telah digunakan untuk bertempur di dalam hutan diubah suai untuk menyesuaikannya bertempur di dalam kawasan terbina. Tentera Darat Malaysia sentiasa memperbaharui doktrin latihannya supaya seimbang dengan keadaan cabaran-cabaran keselamatan.
- \* **Melengkapkan Sumber-sumber:** Satu lagi cara mengoptimumkan sumber adalah dengan menggabungkan sumber-sumber yang berlainan dengan cara yang mana ia akan meningkatkan keupayaan pertahanan. Kerjasama keselamatan dengan agensi-agensi kerajaan yang lain untuk membendung jenayah transnasional yang sedang berleluasa seperti menyeludup manusia, menyeludup dadah, melanun dan melintasi sempadan untuk mengambil perlindungan, akan membuatkan operasi keselamatan lebih berkesan. Melengkapkan sumber-sumber melalui operasi bersama dengan negara-negara lain untuk membendung jenayah yang serupa atau menentang ancaman yang sama juga akan menjadi berkesan.

### Tembak dan ikut lajak

Tembak dan ikut lajak adalah merupakan perkara terakhir yang perlu dilaksanakan oleh

seseorang penembak apabila ia telah memetik pincangan. Bukan sahaja setakat memetik pincangan ia menembak tetapi ia juga mesti menghayati di manakah pelurunya itu akan mengenai Sasaran. Sekiranya ia tidak mengenai Sasaran seperti mana yang dikehendaki maka ia mesti mengikut semula langkah-langkah yang telah dibincangkan tadi atau memperbaiki kelemahan yang wujud.

Dari segi pengurusan ini adalah merujuk kepada pelaksanaan objektif-objektif yang dirancang dan memantau mereka melalui suatu proses kawalan pengurusan untuk menentukan yang aktiviti-aktiviti tersebut mematuhi objektif-objektif yang telah dirancang. Sistem-sistem kawalan adalah perlu kerana rancangan yang terbaik juga boleh jadi tidak keruan tanpa pemantauan yang sempurna.

Di peringkat implementasi, sistem pemantauan termasuk pelaksanaan pemeriksaan Pengurusan Kualiti Menyeluruh (TQM), maklum balas melalui pemeriksaan berkala oleh Jabatan Inspektorat dan pemeriksaan-pemeriksaan pentadbiran lain di setiap peringkat pemerintahan. Maklum balas berkala dikumpulkan melalui laporan-laporan yang mana telah dianalisis di Markas Tentera Darat untuk menentukan objektif-objektif dilaksanakan.

Mekanisma motivasi seperti penghargaan, bantuan material, latihan dan program pembangunan dan insentif dirancang secara serentak untuk membantu anggota-anggota mencapai objektif organisasi. Prestasi organisasi adalah dipantau sebilang masa dan diuji melalui latihan dan eksesais ketenteraan untuk mengekalkan tahap kesiapsiagaan tempur yang tinggi.

### IMPLEMENTASI RANCANGAN

Mengimplementasi wawasan yang berpandukan prestasi adalah satu tugas yang sukar daripada menciptakannya. Ia menyediakan set-set pendekatan strategik yang memerlukan orang-orang di dalam organisasi untuk berfikir, bertindak dan bekerjasama di dalam persekitaran yang baru. Pendekatan yang baru ini mungkin memerlukan perubahan di dalam sikap yang menyeluruh, yang mana tidak boleh dicapai semalam. Oleh itu, ia memerlukan perancangan teliti, yang merupakan kunci bagi mejayakan implentasinya.

Mengadakan sebuah rancangan pelaksanaan memerlukan proses pemikiran yang berhati-hati, munasabah, dan sistematik yang termasuk cadangan-cadangan untuk mengatasi rintangan-rintangan ini. Sebuah ungkapan Melayu lama, yang menggambarkan keperluan untuk perancangan yang baik dan sentiasa proaktif di dalam apa jua situasi, adalah, "sediakan payung sebelum hujan."

Dengan perancangan yang terperinci dan matlamat yang realistik, sebuah organisasi boleh mencapai objektif yang dihasratkannya. Adalah perlu untuk setiap organisasi untuk mempunyai sebuah wawasan yang menggambarkan hasratnya.

Untuk mencapai objektif-objektif ini Tentera Darat memerlukan pegawai-pegawai dan soldadu-soldadu yang bermotivasi tinggi, disiplin dan profesional. Budaya *Marksman* sedang disemai untuk meningkatkan modal insan Tentera Darat Malaysia, supaya ia boleh mencapai wawasan dan misinya.

### **Mengoptimumkan Modal Insan**

Untuk mencapai kredibiliti yang unggul, sebuah organisasi mesti mengoptimumkan sumber manusianya dengan membuatkan mereka menumpukan kepada tugas yang sedang mereka laksanakan. Ini adalah penting kerana ia bukan sahaja akan menaikkan kualiti pengeluarannya, tetapi juga mendorong anggota-anggota untuk berkhidmat lebih lama lagi di dalam organisasi. Menguruskan sumber manusia bermula dengan memilih orang yang betul untuk tugas yang sesuai dan menyediakan peluang-peluang untuk menjadi cemerlang di dalam tugas-tugasnya itu. Satu faktor lain yang penting di dalam membangunkan sebuah tenaga kerja yang mempunyai kecekapan yang tinggi adalah dengan memberikan anggota-anggota ini rasa tanggunjawab dan akauntabiliti. Dengan berbuat demikian, setiap individu di dalam tenaga kerja tersebut akan cuba untuk mencapai yang terbaik di dalam pelaksanaan tugasnya.

### **PENDEKATAN PENGURUSAN**

Walaupun cara berperang sentiasa berubah, peranan Tentera Darat Malaysia tetap tidak

berubah, iaitu untuk menjaga kedaulatan negara dan kepentingan-kepentingannya. Tumpuan Tentera Darat adalah condong kepada melaksanakan misi pelbagai melalui operasi bersama di dalam angkatan tentera dan dengan organisasi-organisasi kerajaan yang lain. Oleh itu, untuk mencapai keperluan tersebut, pemerintah-pemerintah di setiap peringkat mesti memahami wawasan Tentera Darat dan mereka membentuk suatu rancangan untuk menyemai wawasan ini di dalam pemerintahan mereka. Pendekatan pengurusan adalah untuk menggabungkan kepakaran individu dan keupayaan organisasi untuk mencapai satu tujuan bagi mencapai wawasan tersebut. Terdapat lima strategi kepimpinan yang boleh diguna pakai untuk mencapai wawasan Tentera Darat Malaysia semasa mengimpenitmasikan budaya *Marksman*.

**Pendekatan Strategi** adalah cara yang memerlukan rancangan jangka panjang, yang menjelaskan keperluan-keperluan untuk masa hadapan. Ia termasuk perubahan teknologi, pembangunan sumber manusia dan sistem logistik yang mantap untuk menghadapi perubahan persekitaran keselamatan. Pendekatan ini tertumpu kepada analisis dan perancangan. Pendekatan kedua adalah **Pendekatan Aset Manusia** yang menitikberatkan pertumbuhan dan pembangunan individu. Ia mempengaruhi nilai-nilai, kelakuan dan sikap di dalam organisasi untuk mencapai piawaian keberkesanannya yang lebih tinggi. Pendekatan ini menitikberatkan "cara organisasi melaksanakan sesuatu." Yang ketiga merujuk kepada **Pendekatan Kepakaran**, yang cuba untuk meningkatkan pengetahuan, kemahiran dan teknologi organisasi untuk mencapai daya saing. Di dalam konteks ketenteraan, pembangunan sumber manusia bersama kemajuan teknologi akan meningkatkan keberkesanannya kombat organisasi tersebut mengikut cara yang paling efektif. Pendekatan ini cuba mendapatkan orang yang sepadan dengan kepakaran yang setimpal bagi tugas yang betul. Seterusnya, adalah **Pendekatan Kotak**, yang percaya kejayaan organisasi itu bergantung kepada keupayaan untuk memberi kepuasan kepada pelanggan-pelanggan dengan cara yang konsisten.

Di dalam konteks ketenteraan, pelanggan luaran adalah pihak kerajaan, di mana mempertahankan negara dari ancaman luar menjadi keutamaan.

Pendekatan ini menitikberatkan polisi-polisi dan prosedur-prosedur, dan memantau pelaksanaannya. Akhirnya, adalah **Pendekatan Menukar (Change Approach)** yang memberi penekanan kepada kesinambungan ciptaan semula dan memotivasikan orang-perorangan untuk berubah. Kombinasi pendekatan-pendekatan boleh digunakan untuk mencapai wawasan organisasi tersebut. Begitu juga, Tentera Darat Malaysia akan menggunakan pendekatan-pendekatan yang berlainan ini untuk mengimplementasikan wawasan Tentera Darat “2 10 Plus 10”

## KESIMPULAN

Sebagai kesimpulan, sasaran *Marksman* adalah untuk membawa Tentera Darat Malaysia kepada satu tahap kesiapsiagaan tempur yang tinggi, berkesan dan berupaya. Adalah menjadi wawasan

setiap tentera di dunia ini untuk menghasilkan soldadu yang “Berfikir dan Analitikal”. Walau bagaimanapun, ini memerlukan komitmen, dedikasi dan kemahiran yang tinggi dalam setiap soldadu di setiap peringkat pemerintahan dalam organisasi ini. Budaya *Marksman* mesti disemaiakan secara sistematik sehingga ia menjadi sebahagian daripada individu tersebut. Budaya ini ingin menyemarakkan keinginan dalam setiap individu untuk menjadi *Marksman* di dalam fungsi utama mereka dan semasa diberi tugas oleh organisasinya. Budaya ini akan memotivasikan seorang soldadu untuk mencuba sedaya upayanya dan bukanya sekadar mencapai had atau standard yang telah digariskan oleh organisasi itu. Seajar dengan kata-kata Zig Zagler, “Jangan tunggu untuk sesuatu perkara itu berlaku, tetapi mesti lakukanya”, adalah menjadi hasrat yang membara Tentera Darat untuk merealisasikan budaya *Marksman* bagi mencapai wawasan 2 10 Plus 10 nya.

## RUJUKAN

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Mej Christopher Ignatius Choong telah dinauliahkan ke dalam Kor Rejimen Renjer DiRaja pada 24 Ogos 1984. Beliau adalah lulusan Maktab Turus Angkatan Tentera, Haigate pada 1998. Beliau memiliki Diploma Pengajian Strategik dan Pertahanan (1998) serta Ijazah Sarjana Pengurusan (Cemerlang) (2003) dari Universiti Malaya. Beliau juga adalah lulusan *Army Command and General Staff College, Royal Thai Army*, Bangkok Thailand pada 2001. Beliau pernah menjawat pelbagai jawatan di pasukan, pusat latihan serta juga di KEMENTAH. Beliau kini adalah Penolong Pegawai Memerintah 4 RRD.

# KNOWLEDGE MANAGEMENT: MILITARY CONCEPTUAL APPLICATION



By Mej Inderjit Singh a/l Tara Singh

*Knowledge acquisition involves complex cognitive processes: perception, learning, communication, association, and reasoning. Knowledge Management provides a thorough and encompassing approach to reinventing an organization and can enable the realization of considerable benefits to conceptualize all necessities. This is applicable when globalization and technological advances makes it a requirement for all military adversaries to be competitive in enhancing the knowledge based structure in nourishing their organization's intellectual capital.*

*"To attain educational excellence and competent human-skills, we must create a knowledge based society. In this context, the Ministry of Defence should develop a learning organization with human resources focused on intellectual development aimed towards creating 'knowledge workers'"*

*Dato' Sri Najib Tun Razak  
Deputy Prime Minister & Minister of Defence*

## INTRODUCTION

Knowledge Management (KM) caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings (Malhotra, 1998). The military organizations have a unique context in which KM must be deployed and eventually operate. The transition from an industrial era into an information and knowledge era was significant and the relevance of acquiring and managing information and knowledge is becoming increasingly critical (Muzumdar, 1997). A rapid pace of technological change and the required transformation in doctrine and organization predominantly characterize the 21st century Revolution in Military Affairs (RMA). The new warfare highlights the rising importance of

having a knowledge advantage over adversaries. New technologies have resulted in increasingly dynamic, unpredictable and complex operations that require people to filter and analyze information from multiple sources. The globalization of warfare and the accompanying elements of joint and combined operations is another significant change for modern military conflicts. Warfare and its derivatives of peace making and peacekeeping take place on a global stage, far beyond local or regional conflicts. This means that situational awareness and decision-making rely to a greater extent than ever before on sources beyond the immediate theatre. These can be instantaneous and from anywhere in the world.

Working effectively with joint or combined forces in coalition situations also requires the ability to communicate and coordinate operations in a 'seamless' environment. On the human resources side, the military, like their corporate counterparts, recognize the important role of intellectual capital in the modern military enterprise. Human capital,

structural capital and stakeholders provide the platform for intellectual capital which all militaries are embracing them holistically to create a learning organization conforming to Knowledge Force (K Force). Rapid technological advancement means that training must become faster and more effective. Military personnel are rotated through positions for both operational experience and career development. Sense making, problem solving and decision-making are more complex and more essential in military situations than ever before. Similarly, know-how, expertise, and interoperability are also important factors in a military organization's ability to attain knowledge superiority. Command and control is taking on new dimensions, and the role of military personnel is evolving into that of 'knowledge worker'. This article attempts to share the dynamics of knowledge management perspective in the future domain of the military structure in the near future. This paper articulates how knowledge management is effectively used in the military and its application in providing a thorough and encompassing approach to reinventing an organization and can enable the realization of considerable benefits.

## WHAT IS KNOWLEDGE MANAGEMENT?

Knowledge has been identified as the ultimate competitive advantage for the modern firms and therefore should be well managed. According to Davenport and Prusak (1994) knowledge is a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. Knowledge is best

described within the context of the Knowledge Spectrum which includes the element of data at the lower end of the scale, progresses to information when value added, then to knowledge and finally to wisdom as depicted in **Figure 1**.

In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms. Knowledge assets within an organization is the capitalization of the members of the organization, and it is a collaborative work to share and use information which marks the effective use of knowledge and which KM tries to promote (Milam, 2001). The true process of creating new knowledge, takes place subsequently when the different pieces of knowledge are set in context, organized, linked to one another and compared to the individuals' previous experiences (Gauvin & Lecocq, 2004). Thus, the most of the knowledge creation activities happen when collaborating with other military personnel, internal or external to the organization.

Knowledge can be described as consisting of two types: explicit and tacit. In relations to managing knowledge within organization, Raja Abdullah (2005) cited that KM deals with both tacit and explicit knowledge in an organization, with regards to knowledge creation, sharing, and how these activities promote learning and innovation. Explicit knowledge is that readily quantifiable knowledge that can be transferred in written form. This includes knowledge or work processes that are transferred via standard operating procedures, manuals and training courses. Tacit knowledge is the type of knowledge that can only be transferred through experience and is the most difficult type of knowledge to quantify or explain. It is acquired through a mix of framed experience, values, contextual information, experiences and information. Through individual experience information is transformed into knowledge in a number of ways. First, the information about a given situation can be compared with other situations that are known. Secondly the consequences or implications of the information on decisions and actions are considered. Thirdly connections are made between this piece of information and how it relates to others that are known. Finally through conversation other people's thoughts on a piece of information are gathered. Through these methods each individual

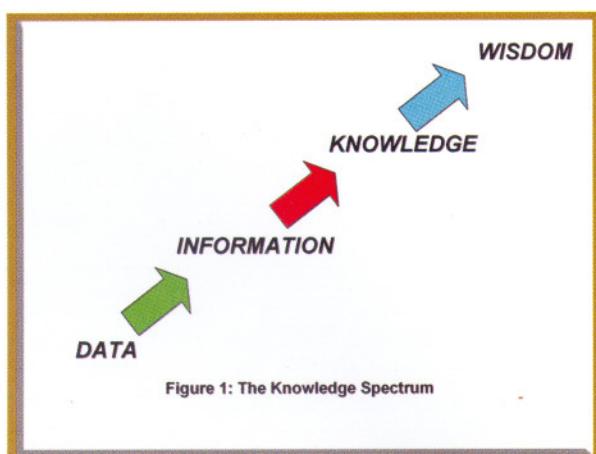
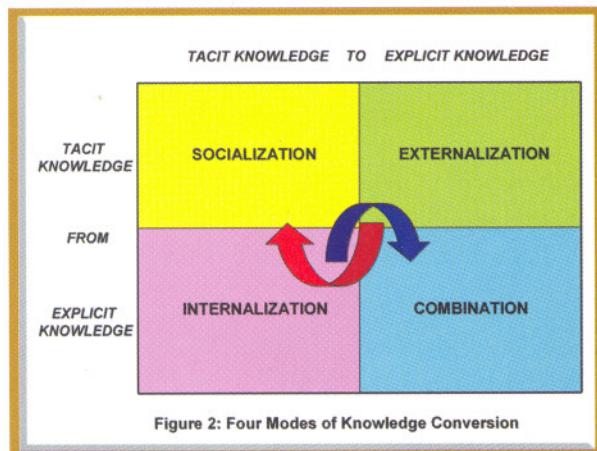


Figure 1: The Knowledge Spectrum

transforms information into knowledge. Nonaka and Takeuchi (1998) argue that effective organizational knowledge creation best occurs through the spiral process where knowledge is converted from tacit to explicit in a continuous and dynamic cycle, as illustrated in **Figure 2**.



It is when tacit knowledge and explicit knowledge interact that innovation occurs. Knowledge creation is facilitated by deliberately managing the cycle. Organizational knowledge creation begins with socialization, where individuals share experience and mental models. It develops into externalization when individuals use metaphors or analogies to articulate hidden tacit knowledge that is otherwise difficult to communicate. It moves into the combination phase for knowledge to be articulated, shared and expounded. Finally, individuals learn by doing and internalizing the new knowledge. The spiral begins again as the experience-based operational knowledge learned in the first cycle provides a larger knowledge base for continuous innovation and growth.

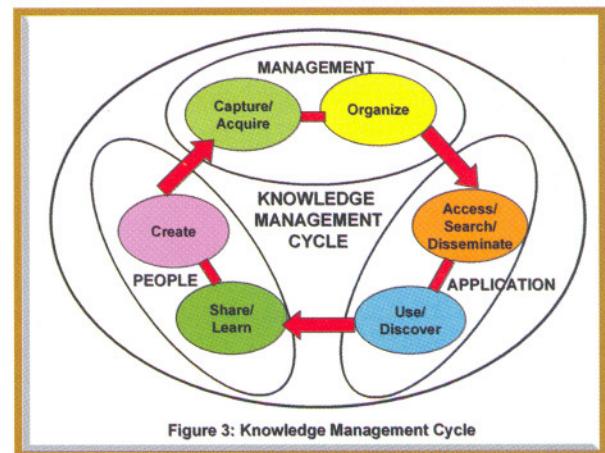
## KNOWLEDGE MANAGEMENT CYCLE

Knowledge processes in a KM environment are managed to convert knowledge for action and to achieve the desired results of increased value in the organization or specific operations as illustrated in the model in **Figure 3**. There are three general perspectives in the cycle: management, application and people:

**Management** focuses on capturing, organizing and facilitating knowledge. Many of these activities

span the externalization and combination quadrants of the Nonaka model.

**Application** focuses on effective retrieval of relevant content through advanced searches and mining to conduct knowledge-related work and tasks and on the use of the results for discovery. It relies on the knowledge combination portion of the model.



- **People** focus on learning, sharing and collaboration. This is the education component of the cycle that is within the internalization quadrant, moving into the socialization portion.

Initially, through sense making, an organization interprets the ongoing environmental data and establishes a shared understanding. If the experience is routine and known, then the organization can go directly into the process of decision-making. In this stage, the organization searches for more information and selects alternatives. The Nonaka model of knowledge creation is engaged when the sense-making process has determined that new knowledge is required or that the situation is novel and requires new responses. After the sense-making process, the organization then calls upon a knowledge-creation process that will give it additional input to move into the final stage of decision-making.

This cyclical model is reminiscent of the command and control OODA loop (Observe, Orient, Decide, and Act) in which information and then knowledge are transformed into action. McCann

and Pigeau have also applied the Nonaka model to a redefinition of command and control theory.

Information Technology experts would have us believe that knowledge management is synonymous with information management. They would have it that a good information management system, provided by information technology specialists, will resolve all knowledge management problems. Knowledge management is an attempt to recognize what is essentially a human asset buried in the minds of individuals, and leverage it into an organizational asset that can be accessed and used by a wider set of individuals within the organization. A working definition of knowledge management is “the commitment to create new knowledge, disseminate it throughout the organization and embody it in products, services and systems”. Although this definition does not make it clear, knowledge management includes the dissemination and embodiment of existing knowledge in addition to the creation of new knowledge. Knowledge management includes, but is not limited to, activities such as encouraging creativity and innovation, developing knowledge management systems, creating a culture of knowledge sharing and evolving into a learning organization.

## **KNOWLEDGE MANAGEMENT APPLICATION IN DEFENCE**

The transfer of tacit knowledge within Defense relies significantly on existing informal organizational structures. Tacit knowledge exchange occurs primarily within immediate work locations, either within integral sections or between sections that are geographically collocated. It is also more prevalent between sections that are closely aligned in their responsibilities and work practices. What is needed is the superiority of information and knowledge retrieved and reported so that the defense and integrity of the nation is preserved.

There are cases of where tacit knowledge is transferred across organizational boundaries. This primarily occurs where existing formal structures influence the interaction between staff (e.g. where meetings are organized between technical staff from different areas) or where there are strong developed informal structures. However,

physical boundaries such as geographic location, information technology infrastructure and the prevalence of a strict hierarchical structure are effective barriers to knowledge management. Whilst the before mentioned examples of tacit knowledge management rely significantly on informal processes, the transfer of staff between sections and work locations on higher duties inadvertently provides a valuable medium for the transfer of tacit knowledge. These staff brings with them to the new work environment knowledge from their previous work environment. They also gain knowledge whilst occupying the higher duties appointment and will invariably take this knowledge with them to share with co-workers at their original work location. Despite this powerful and effective method of transferring tacit knowledge that has been achieved through opportunity, no formal process of leveraging this method by periodically transferring staff to other sections to work at the same level is evident in defense. Additionally, there is generally no intrinsic knowledge management culture within defense that transcends boundaries other than that which exists on a limited local level.

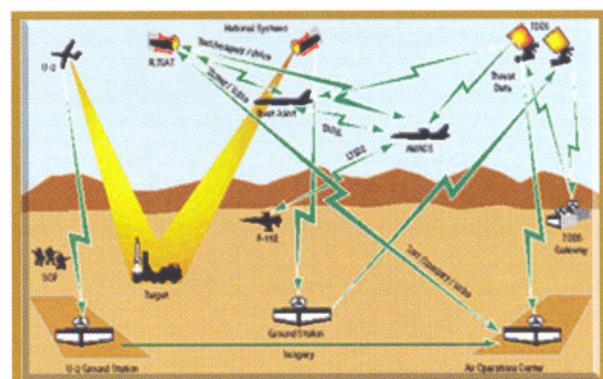
The formal knowledge management processes within defense include Standard Operating Procedures, Regulations, Handbooks, and databases. However, these are often dated and no longer reflect current work practices. To overcome this there is some localized development of processes that reflect practice. However these are rarely available for use throughout the organization. Even in strict areas of discipline such as resource management change has generally surpassed written processes and in some cases rendered them ineffective. This has placed a stronger emphasis on the tacit dimension of knowledge and requires experienced workers to advise on where written processes can be found, how current they are and what the alternative processes are. This is conducted effectively at the local level but is rarely captured outside of the minds of the knowers and made available extensively across the organization. The available information technology infrastructure is also not utilized to its full potential for formal knowledge management. Despite the use of knowledge management software within the military there is limited use of databases to capture and distribute knowledge. There is also no formal structure to the organization of information and knowledge stored in the infrastructure, which

subsequently differs from area to area. This makes it difficult for the stored knowledge or information to be shared with other areas. The difficulties posed by the apparent lack of coordination of formal knowledge management processes places a heavy burden on the transfer of tacit knowledge and the conduct of training.

According to a study conducted for the Directorate of Military Programs, Headquarters, U.S. Army Corps of Engineers, knowledge work is the area that offers the greatest opportunity to increase productivity within the US workforce. Ongoing research at the US Army Construction Engineering Research Laboratories is developing the Knowledge Worker System, an integrated performance support environment designed to improve the performance of Army knowledge workers (Thomas et al., 1995). A classic example on the application of knowledge management in the real theatre is the US Army's Centre for Army Lessons Learnt (CALL), which was established to capture the truths of real situations that have been experienced rather than learnt from theory or generalization. Personnel from CALL participate in real operations and record information for later analysis and dissemination as lessons. The lessons from CALL assisted US troops in Somalia, Rwanda, Haiti, and the Gulf. A key aspect of the success of knowledge management at CALL is the "After Action Review" program. The After Action Review (AAR) "involves an examination of what was supposed to happen in a mission or action, what actually happened, why there was a difference between the two, and what can be learnt from the disparities". The process involves all participants in an operation or action meeting together in an environment of openness free from judgment where no blame is laid and no topic is taboo. The AAR has become a common event within the US Army and is traditionally the last event in any activity conducted. It has contributed to the development of a knowledge sharing culture in the US Army whereby the lessons learnt that have been identified by an AAR are available for anyone within the US Defense Forces to view. This process has become so powerful that it has transcended its original intent as a tool to analyze training and operations and has become a common tool for all activities. The AAR is a powerful knowledge management tool that would provide significant benefit to Defense.

## KNOWLEDGE MANAGEMENT APPLICATION IN NETWORK CENTRIC WARFARE

The interactive picture that gives a timely and accurate assessment of all operations within the battle space enables the decision maker or group to gain a clear understanding of the current situation with regard to opposing forces and the environment, as well as to visualize a desired end-state. Currently, the problem is exceedingly complex because there are vast quantities of information requiring weeding, sorting and analysis. Data fusion and information management can be and are applied to the problem, but without the addition of knowledge conversion processes they can contribute to the overload. The management of knowledge in such complex environments should enhance the effectiveness of situational awareness systems. The nature of operations has dramatically changed within the context of the present RMA, changes that

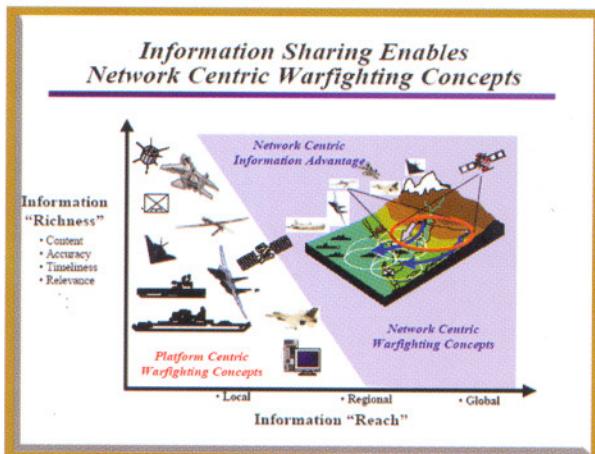


*Knowledge Management Application In Network Centric Warfare*

have mainly been brought about by new technology advances in warfare and a more sophisticated international environment. The emergence of Network Centric Warfare<sup>1</sup> (NCW) (Stein, 1998), has now become a new trend towards adopting the NCW paradigm as a means for "information superiority" within most allied nations. The concept of "Network-Centric Warfare" is a derivative of "network-centric computing." The evolution of computing from "platform centric computing" to "network-centric computing" has been largely

<sup>1</sup> The tenets of NCW is the sharing of information and collaborating with others about meaning of the information improves both the quality of the information and the quality of the awareness (Journal of Defense Science, Vol. 8, No.3 , 2003).

enabled by recent key developments in information technology. Even though the applications of KM strategy in military context is still at embryonic stage, there are extensively applied in major countries, like the United States, Britain, Canada, Australia and several countries within this region like Japan, Korea, and Singapore to name a few. Enterprise portals are recognized as a promising technology to meet the requirements of NCW by enabling organizations to access, to share and to manage information and knowledge (Gauvin, Claire, Brisset, & Auger., 2004). KM strategy is the center of the military's information revolution, which becomes the enabler for mission operations, knowledge generation, information delivery and technology innovation (Browning, 2002).



Knowledge superiority in military operations requires dominant battle space awareness and visualization. As the battlefield changes and the tempo of war increases, the pace of information creation and decision-making also multiplies<sup>2</sup>. Modern warfare relies on information from many sources that must be assessed and compiled for immediate use. The timelines are shorter, and the

<sup>2</sup> Peter Brook and Tim Thorp. "C3I in the defence 15 in Journal of Barbara Waruszynski, The Knowledge Revolution:

players more individually significant in their roles. This type of warfare requires superiority at all levels of command and control. It demands situational awareness tools that are superior to those of opponents for anticipating their reactions, for sense making, for problem solving and for superior decision-making. Knowledge management (KM), which facilitates the creation and use of knowledge for increased innovation and value, could have a profound influence on the doctrinal shift anticipated by the RMA

## CONCLUSION

The development of modern warfare is reflected by the rising importance of having a knowledge advantage over adversaries. Knowledge management is a bottom-up predominantly qualitative process that focuses on effectiveness rather than efficiency. It assumes that management can gain most from the creative and innovative ways that people actually get things done. As a strategic approach to achieving defense objectives, military KM will play a valuable role in leveraging existing knowledge and converting new knowledge into action through the KM cycle. These applications illustrate how KM principles can be brought to situational awareness, sense making, and decision-making in military settings. The knowledge inculcation in the new warfare in NCW with the RMA platform highlights the importance of having a knowledge advantage over adversaries. Implementation of the After Action Review (AAR) process practiced in US Army provides the single greatest opportunity for harnessing the knowledge resident within an organization. It will provide the potential to achieve significant efficiencies in resource expenditure and increase corporate outputs. Allocation of dedicated resources for knowledge management will provide the potential to deliver all military organizations as a world-class organization and enable it to achieve its outputs with diminishing resources.

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# PERANAN MASJID DI DALAM ERA GLOBALISASI



Oleh Lt Kol Murtadza bin Hj Noordin

*Umat Islam perlu berubah dengan pemikiran baru supaya paradigma peranan dan fungsi masjid boleh diperbetulkan dan diubah. Peranan masjid mestilah ditonjolkan sebagai institusi untuk umum dan bukannya untuk sebilangan kecil umat Islam yang selalu dikenali sebagai orang masjid. Masjid mestilah berperanan secara lebih aktif bukan sebagai untuk mengadakan kuliah-kuliah pengajian sahaja tetapi juga untuk menarik perhatian sebahagian besar masyarakat yang lain supaya berminal untuk hadir ke masjid untuk tujuan-tujuan ibadah, kenduri-kendara, kuliah-kuliah, aktiviti-aktiviti sosial dan kemasyarakatan dan sebagainya. Fahaman Islam yang sebenar secara integrasi, mencantumkan ibadat dengan berbagai aktiviti-aktiviti hidup, malahan memperluaskan skop ibadah hingga merangkumi hampir kesemua urusan hidup manusia; dunia dan akhirat.*

*'Hanyalah yang memakmurkan masjid-masjid Allah ialah orang-orang yang beriman kepada Allah dan hari kemudian, serta tetap mendirikan solat, menunaikan zakat dan tidak takut selain Allah, maka mereka lah orang-orang yang diharapkan termasuk golongan orang-orang yang mendapat petunjuk'.*

*Surah Al Taubah ayat 18.*

## PENDAHULUAN

**M. Jusoff Taib** menyatakan bahawa, jika Islam merupakan agama yang mencantumkan ukhrawi dan duniawi, maka masjid adalah lambang kepada kerohanian Islam itu.<sup>1</sup> Masjid adalah sumbu yang menyalakan kerohanian, keilmuan dan kebudayaan Islam; yang tidak dapat dipisahkan ibarat isi dengan kuku. Memperkatakan tentang arus kepincangan dan penghinaan terhadap Islam dewasa ini, banyak yang telah diperkatakan tentang peranan dan fungsi institusi masjid di dalam era kontemporari. Setengah pihak mencadangkan agar umat Islam kembali ke pangkal jalan; 'back to basic' iaitu kembali ke masjid. Hanya dengan umat Islam kembali ke masjid maka masalah umat Islam akan

dapat diselesaikan dan keagungan sinar Islam akan kembali tersohor. Ada sesetengah pihak pula yang cetek ilmu agamanya, yang hanya melihat masjid sebagai tempat ibadat semata-mata dan menganggap bahawa permasalahan umat Islam dewasa ini tiada berkaitan dengan kegagalan fungsi masjid. Kononnya masjid hanyalah untuk umat Islam beribadat semata-mata; tidak boleh membicarakan tentang politik, ekonomi dan urusan kehidupan dan kemaslahatan manusia yang lain. Pemisahan yang nyata antara kehidupan dunia dan akhirat ternyata bertentangan dengan ajaran Islam yang sebenar. Disaat umat bukan Islam dan bangsa lain sibuk di dalam mengejar kemajuan sains dan teknologi di dalam era globalisasi, umat Islam lemas di dalam kancah dan kemelut arus kehinaan akibat dari keghaflahan dan kealpaan, menyisihkan diri dari masjid lantas lupa diri dan terpesong dari landasan ajaran agama Islam sebenar.

<sup>1</sup> M. Jusoff Taib, Kenapa Masjid Terpencil Dari Umat, Dakwah, September 1995.

Persoalan timbul mengapa masjid yang mahal dan indah ukiran serta senibinanya yang penuh dengan unsur-unsur dan nilai-nilai estetika; luas perkarangannya yang dihiasi dengan taman-taman serba-loka tetapi hanya dimanfaatkan pada hari tertentu dan oleh hanya segolongan orang-orang tertentu sahaja? Bagaimanakah institusi masjid dapat memainkan peranannya di dalam memimpin umat Islam ke arah jalan yang sebenar terutama di dalam era global yang serba mencabar ini?

## TUJUAN

Artikel ini akan cuba menjawab persoalan di atas melalui perbincangan secara ringkas tentang peranan serta fungsi institusi masjid di dalam era globalisasi serta membuat perbandingan tentang peranan dan fungsi masjid kontemporari dengan apa yang telah di praktikkan pada masa zaman Nabi Muhammad saw.

## Definisi

Sebelum kita pergi lebih jauh di dalam membicarakan tentang peranan masjid di dalam era globalisasi, elok sekiranya kita bincangkan definisi kedua-dua istilah ini iaitu; apakah masjid dan apakah yang dikatakan globalisasi?

Menurut **M. Quraish Shihad** di dalam bukunya '**Wawasan Al Quran**', kata masjid terulang sebanyak 28 kali di dalam Al Qur'an.<sup>2</sup> Dari segi bahasa, perkataan masjid di ambil dari akar kata sajada - bermaksud sujud yang bererti patuh, taat setia, serta tunduk dengan hormat dan takzim. Meletakkan dahi, kedua tangan, lutut dan kaki ke bumi, yang kemudian dinamakan sujud oleh syariat, adalah bentuk lahiriah yang paling nyata dari makna di atas. Itulah sebabnya mengapa bangunan yang dikhususkan untuk melaksanakan solat di namakan masjid, yang ertinya '**tempat bersujud**'.<sup>3</sup>

Menurut M. Quraish lagi, di dalam pengertian sehari-hari, masjid merupakan bangunan tempat solat umat Islam tetapi kerana akar katanya mengandungi makna tunduk dan patuh, maka

hakikat masjid adalah tempat melakukan segala aktiviti yang mengandungi kepatuhan kepada Allah swt semata-mata. Seterusnya M. Quraish menukilkan sepotong ayat Al Qur'an yang bermaksud:

*'Sesungguhnya masjid-majid itu adalah milik Allah, kerana itu janganlah menyembah selain Allah sesuatu pun.'*

*Surah Al Jin- ayat 18*<sup>4</sup>

Di dalam memperkuatkan hujahnya M. Quraish juga telah menukilkan sepotong Hadis Rasulullah saw yang bermaksud:

*'Telah dijadikan untukku (dan untuk umatku) bumi sebagai masjid dan tempat penyucian diri.'*

*(Hadis riwayat Bukhari dan Muslim dari Jabir bin Abdullah)*<sup>5</sup>

Berdasarkan dalil-dalil di atas, jika kita kaitkan bumi ini, maka masjid bukan hanya sekadar tempat sujud serta sarana penyucian dan tidak hanya sebagai bangunan tempat untuk bersolat tetapi masjid juga bererti tempat melaksanakan segala aktiviti manusia yang mencerminkan kepatuhan kepada Allah swt.<sup>6</sup>

Setelah mengetahui makna dan ertikata masjid dengan maksud sebenarnya marilah kita kaji akan maksud globalisasi. Menurut **American Heritage Illustrated Encyclopedia Dictionary**, globalisasi bermaksud: '*the act, process, or policy of making something world-wide in scope or application*'. Manakala **The New Oxford Illustrated Dictionary** pula memberi makna: *....of the whole of a group of items, categories, etc, excluding over, the whole world*. Menurut **Kamus Dwibahas Dewan Bahasa dan Pustaka**, globalisasi berasal dari perkataan **global** bermaksud **merata dunia, kesejagatan** ataupun **menyeluruhan**. Globalisasi umumnya merujuk kepada integrasi negara-negara ke dalam suatu sistem dunia (seperti ekonomi dan lain-lainnya) yang bersepada dan saling memerlukan di mana faedah daripada globalisasi di kongsi bersama oleh negara-negara di dunia.

<sup>2</sup> M. Quraish Shihad, *Wawasan Al Quran*: Tafsir Maudhu'i Atas Pelbagai Persoalan Umat, Penerbit Mizan, Bandung, 1996, hal 459.

<sup>3</sup> M. Quraish Shihad.

<sup>4</sup> Ibid., hal 459.

<sup>5</sup> Ibid., hal 460.

<sup>6</sup> M. Quraish, hal 460.

Globalisasi meletakkan syarat bahawa negara-negara dunia harus melonggarkan syarat-syarat dan peraturan domestik yang menghalang kepada proses globalisasi. Ini bermakna membuka negara berkenaan kepada dunia luar dalam konteks '**dunia tanpa sempadan**' ('**borderless world**').<sup>7</sup> Menurut Dr Fathi Yakan di dalam bukunya '**Islam Era Global**', pergerakkan dunia semakin laju, perjalanan yang dulunya mengambil masa yang lama dan membosankan kini semakin cepat dan pantas.<sup>8</sup> Runtunan peristiwa yang berlaku di mana-mana dapat kita saksikan secara terus dan langsung walaupun ianya terjadi ribuan batu jauhnya. Kemajuan teknologi tersohor mampu mencipta mikrocip yang hanya sebesar kepala jarum tetapi mampu menyimpan jutaan data-data yang kalau ditulis mampu melahirkan berjilid-jilid buku seperti ensiklopedia.

Menurut Prof Madya Mohamed Abu Bakar, globalisasi adalah apa yang dikatakan pindah nilai cara berfikir manusia cara Barat dari satu daerah ke satu daerah yang lain. Ianya telah berlaku sejak dulu tetapi baru sekarang terserlah hasil dari penemuan yang rancak dan mendalam di dalam bidang sains dan teknologi. Menurut beliau lagi, globalisasi ala Barat yang muhlu di suapkan di dalam dunia Islam adalah cara fikir dan idea dari Barat yang muhlu mengubah cara hidup Islam yang syumul dengan apa yang dikatakan pemodenan nilai-nilai paksi sekular Barat yang ternyata didalangi oleh Zionis Amerika.<sup>9</sup>

Menurut Dr Fathi, rantaian perubahan-perubahan ini adalah hasil dari pertukaran geobiologi dan demografi yang terjadi di Eropah yang telah menyebabkan runtuhnya empayar Kesatuan Soviet yang mana telah menjadikan Amerika Syarikat saat ini merupakan satu-satunya blok yang dominan. Kuasa hegemoni dan uni-polar Amerika Syarikat telah di isytiharkan oleh George Bush sebagai apa yang di panggil '**Orde Baru Dunia**' ('New World Order').<sup>10</sup> Kononnya '**Orde**

**Baru'** ini memungkinkan masyarakat antarabangsa menikmati udara demokrasi dan kebebasan dengan hancurnya imperialism dan sosialisme. Menurut Dr Fathi lagi, Orde Baru Dunia saranan Amerika tidak ubah merupakan satu orde baru yang mengalir licik darah Zionisme yang terang-terang muhlu menghancurkan Islam.<sup>11</sup>

### Efek Globalisasi Terhadap Islam

Menurut Prof Madya Mohammad lagi, nilai-nilai sejagat telah menular ke dalam masyarakat yang mana nilai kampung telah diperbandarkan. Nilai-nilai global akan terus berkembang muhlu tidak muhlu dan secara tidak langsung telah menyemai benih nilai hedonisme yang akhirnya akan membawa kepada perkembangan dan pembangunan masyarakat Islam yang permisif dengan nilai-nilai yang bercanggah dengan agama. Pensejagatan yang berlaku mencakupi pensejagatan umum, pensejagatan ekonomi dan pensejagatan nilai-nilai dan norma-norma sosial ala Barat. Nilai-nilai hedonisme ini akan menjuruskam manusia muslim lalai dan lena di dalam kelazatan jasmaniah yang melampaui.<sup>12</sup> Dr Muhamad Uthman El Muhammady menggelar kumpulan manusia ini sebagai '*one dimensional man*'.<sup>13</sup>

Menurut Akbar S. Ahmed, cara untuk mengenal identiti fizikal sesebuah masyarakat, kita harus melihat institusi masjid serta rangkaianya yang memberi gambaran tentang kesatuan dan ketegasan dari perspektif Islam. Katanya lagi jika kita membuat perbandingan di antara gereja di Barat dan masjid, gereja tidak membawa pengaruh politik dan sosial yang nyata di kalangan orang Kristian sebagaimana peranan masjid di kalangan masyarakat Islam. Beberapa tema ternyata jelas dan nyata di mana terdapat pergelutan universal berlaku di antara unsur yang baik dan jahat. Dunia dilihat telah di dominasikan secara berperingkat oleh kuasa Barat terutamanya Amerika Syarikat yang jelas memberi gambaran tentang kemerosotan nilai-nilai moral dan spiritual. Sex, dadah dan keganasan adalah apa yang disuapkan oleh Barat melalui globalisasi (Internet, filem dan siaran

<sup>7</sup> Utusan Malaysia, Isnin, 16 Oktober, 2000, hal 22.

<sup>8</sup> Dr Fathi Yakan, Islam Era Global, Penerbit Ababil, Yogyakarta, 1996, hal 39.

<sup>9</sup> Prof Madya Mohammed Bin Abu Bakar, Ketua Unit Pengajian Strategik dan Antarabangsa, Fakulti Sastera dan Sains Sosial, Universiti Malaya. Beliau adalah panel jemputan di dalam sesi Wacana Pemikir yang bertajuk Keselamatan Negara Dalam Era Globalisasi, yang telah diadakan di Maktab Pegawai Kanan PDRM, Kuala Lumpur pada 27 Jun 2000. Penulis telah hadir sebagai peserta.

<sup>10</sup> Dr Fathi, Islam Era Global, hal 5

<sup>11</sup> Ibid., hal 10.

<sup>12</sup> Prof Madya Mohammed.

<sup>13</sup> Dr Muhammad Uthman El Muhammady, Institusi Masjid Yang Bersifat Futuristik, Konvensyen Ke arah Pemantapan Institusi Masjid, Kuala Lumpur, 30 Jun 1997.

TV) dan umat Islam mesti menentang semua itu dengan ketaatan, kekuatan moral dan keagamaan, demi untuk mengelakkan keagungan Islam dari tersinar.<sup>14</sup>

## Konsep Pembangunan

Menurut **Prof M. T. Kandil**, konsep pembangunan biasanya difahami kebanyakan orang sebagai usaha-usaha yang boleh membawa kemajuan material atau fizikal kepada sesebuah negara atau masyarakat. Pembangunan ini meliputi aspek infrastruktur, pembangunan industri, skim perumahan, mendirikan sekolah, hospital dan sebagainya. Kesemuanya ini memang satu usaha yang baik akan tetapi konsep pembangunan secara Islam adalah lebih luas dan bersifat integrasi. Pembangunan secara Islam berkisar di sekitar manusia, bertujuan membentuk peribadi Muslim yang soleh dengan ertikata yang lengkap dan sebenarnya yang sesuai dengan kehendak firman Allah swt yang bermaksud:

*'Maka sesungguhnya bumi ini diwarisi oleh hamba-hamba Ku yang soleh (paling layak)'.<sup>15</sup>*

Jika proses pembangunan ummah dapat diusahakan mengikut panduan Islam maka terselamatlah proses itu dari segala gejala tidak sihat yang sentiasa berlaku. Untuk menuju ke arah matlamat itu, maka masjidlah yang seharusnya dianggap sebagai satu-satunya institusi yang berupaya memainkan peranan utama dalam pembentukan peribadi Muslim yang unggul, bermoral dan layak mengambil bahagian secara cergas di dalam berbagai bidang pembangunan dan kemajuan ummah.<sup>16</sup>

## Masjid Zaman Rasulullah saw

Menurut M. Quraish, ketika Rasulullah saw berhijrah ke Madinah, langkah pertama yang Baginda saw lakukan adalah membangunkan masjid kecil yang berlantaikan tanah dan beratapkan pohon kurma. Dari sana baginda membangunkan masjid yang besar, membangunkan umat sehingga

kota tempat Baginda membangun itu benar-benar menjadi Madinah(seperti namanya) yang erti harfiahnya adalah '**tempat peradaban**' atau paling tidak, dari tempat tersebut lahir benih peradaban baru umat manusia.<sup>17</sup>

Menurut **Amaludin Darus** di dalam bukunya '**Kembali ke Masjid**', Nabi saw telah mendirikan masjid di Madinah, satu-satunya masjid yang diizinkan dibina atas dasar taqwa (Surah Al Taubah ayat 108) yang merupakan alat perpaduan politik Islam. Justeru kerana itulah, fungsi masjid di dalam Islam, maka Nabi saw telah perintahkan supaya dibakar sahaja sebuah masjid lain yang telah dibina oleh Abdullah bin Ubai kerana pembinaannya akan memecah-belahkan umat Islam di Madinah ketika itu.<sup>18</sup>

Jelasnya masjid menjadi pusat ibadat Nabi saw dari awal dan seterusnya menjadi pusat sahsiah dan keagamaan umat Islam. Di sini Nabi saw menghimpun umat Islam untuk beribadat, Baginda berkhotbah, berbicara tentang hidup, kerohanian dan hidup kemasyarakatan. Di sini Nabi mengawal kehidupan keagamaan, kerohanian dan siasah umat Islam. Di sini juga Nabi memutuskan hukuman, menghantar keluar tentera untuk pergi berjihad, rombongan keluar berdakwah dan di sini diadakan pertemuan dengan wakil-wakil asing. Masjid jadi nadi dan pusat gerakan Islam yang terpenting dalam kehidupan umat Islam seluruhnya.<sup>19</sup>

## Pusat Pendidikan

Menurut Dr Muhammad Uthman, masjid ketika zaman Nabi saw bukan sahaja merupakan markas pendidikan bahkan ianya juga sebagai Universiti umat Islam. Di sana Nabi saw mengajar Al Qur'an, hadith, ilmu Islam yang lain hingga masjid Madinah berkembang menjadi pusat pengajian Islam yang tersohor. Sistem Madrasah yang terkenal di dalam sejarah pendidikan Islam bermula daripada pendidikan masjid. Sebagai pusat pengajian Islam, Masjid Nabawi menjadi Institut Pengajian Islam yang pertama dalam sejarah di mana gurunya Nabi saw sendiri manakala anak muridnya adalah terdiri dari para sahabat-sahabat yang kemudiannya

<sup>14</sup> Akbar S. Ahmed, Postmodernism and Islam: Predicament and Promise, Routledge, London, 1992, hal 195-196.

<sup>15</sup> Prof M.T. Kandil, Budaya Ilmu di Masjid, Dakwah, September 1995.

<sup>16</sup> Ibid.

<sup>17</sup> M. Quraish, hal 461.

<sup>18</sup> Amaluddin Darus, Kembali ke Masjid , Penerbitan Abadi Entaperais, Kuala Lumpur, 1979, hal 26.

<sup>19</sup> Dr Muhammad Uthman.

menjadi tenaga pengajar setelah kewafatan Nabi saw.<sup>20</sup>

Perkembangan ini terus menular dengan tersebarnya Islam keseluruh pelusuk dunia di mana pembesar Islam akan membina masjid di setiap wilayah yang baru ditakluk. Ketika Uqbah Ibnu Nafei membangunkan Kota Al Qairawan di Tunisia pada tahun 50 H (671M), ahli sejarah berkata bahawa Uqbah telah mendirikan sebuah masjid yang mempunyai kota, bukan kota yang mempunyai masjid. Ini menunjukkan kerja membangunkan masjid adalah lebih penting daripada membangunkan kota. Selama 4 abad (50-450H) Masjid Al Qairawan telah menjadi tumpuan para ulama dan penuntut dari seluruh dunia Islam. Seterusnya telah muncul pembangunan banyak lagi masjid - masjid yang lain yang antaranya seperti berikut:

- **Masjid Al Qaraweyin** - Masjid ini telah dibina di Kota Fas, Maghribi, pada tahun 245 H(859 M). Masjid ini menjadi pusat Islam dan ilmu Sains yang lain seperti ilmu perubatan, ilmu fizik, ilmu matematik dan sebagainya.
- **Masjid Al Azhar** - Masjid ini telah dibina pada tahun 361 H (972 M). Pada mulanya masjid ini telah diberi nama Masjid Jami'ah Al Qahirah sempena nama bandar Kaherah tetapi telah ditukar kepada Al Azhar sempena nama Siti Fatimah Az Zaharaa, anak perempuan Nabi saw. Kini masjid ini telah menjangkau hampir seribu tahun dan telah menjadi pusat pengajian tinggi Islam yang telah memberikan khidmat cemerlang di dalam bidang pengetahuan kepada seluruh dunia Islam. Kini lebih 100,000 orang menuntut di Universiti Al Azhar dan sepanjang sepuluh abad yang lalu, universiti ini terus berkembang menjadi sebuah Universiti Islam sedunia yang tersohor yang telah mengeluarkan ribuan tokoh dan pejuang Islam yang terkemuka.<sup>21</sup>

## Pusat Kegiatan Sosial

Nukilan sejarah Nabi saw dan sahabat ra telah menunjukkan masjid merupakan kegiatan sosial

umat Islam yang terpenting. Di sana telah dilakukan akad nikah, perhimpunan mengingati hari-hari besar Islam, majlis pertemuan para cendekiawan dan pemimpin. Masalah diselesaikan melalui mesyuarat di kalangan ahli mesyuarat dan pemimpin serta penduduk setempat. Dengan terbinanya Masjid Madinah, Nabi saw dan para sahabat bukan sahaja melakukan solat berjemaah dan mengajar ilmu tetapi telah menjadi tempat berhimpun umat Islam. Di dalam masjid, Baginda menerima rombongan Banu Thaqif yang belum memeluk Islam dan mengadakan rundingan dengan mereka. Khemah-khemah telah didirikan untuk mereka di dalam kawasan masjid. Begitu juga dengan kabilah Banu Tamim yang bertemu dengan Nabi saw selepas Baginda solat. Selepas perang Uhud, pemimpin Islam bermalam di masjid, orang luka dirawat di masjid, tawanan perang diikat di tiang masjid dan Sa'd ibn Muaz meninggal dunia kerana luka di dalam khemah yang telah di dirikan di dalam kawasan masjid. Malahan Nabi saw terima sedekah dan membahagikannya di dalam masjid di kalangan sahabat. Pernah berlaku di mana orang-orang Abyssinia melakukan tarian pedang dan lembing di dalam kawasan masjid dan telah disaksikan oleh Nabi saw dan Aisyah.<sup>22</sup>

## Pusat Kerohanian

Ianya sangat nyata di mana sejak mula Nabi saw membina masjid dari pelepas tamar hingga menjadi bangunan yang besar dan luas, masjid merupakan pusat peribadatan umat Islam. Banyak amalan-amalan yang dilakukan di dalamnya antaranya; solat berjemaah, solat Jumaat, sunat nawafil, solat tarawikh di bulan Ramadhan, solat jenazah, solat hajat, bacaan Al Qur'an, wirid, zikir serta banyak lagi kegiatan kerohanian yang lain.<sup>23</sup> Kegiatan-kegiatan kerohanian ini dihidupkan oleh Nabi saw dengan semaksimum mungkin di dalam masyarakat dan kita lihat fungsi rohaniah bersemadi dan tersemat di jiwa para sahabat ra dan telah menimbulkan pengaruh yang tersangat berkesan dan daya tahan yang tinggi terutama di dalam menghadapi cubaan dan rintangan ketika Islam mula tersebar.

<sup>20</sup> Dr Muhammad Uthman.

<sup>21</sup> Prof M. T. Kandil.

<sup>22</sup> Dr Muhammad Uthman.

<sup>23</sup> Dr Muhammed Uthman.

## Perkembangan Masakini dan Akan Datang

Ledakan perkembangan teknologi maklumat dan arus kedinamikan manusia telah menjadikan kedudukan, fungsi dan peranan masjid menjadi semakin mencabar. Fungsi masjid perlu difahami dan dijayakan dengan baik serta berkesan demi untuk menghadapi masaalah-masaalah manusia sejagat dengan perlaksanaan tugas-tugas yang dituntut oleh agama dan masyarakat yang dinamik. Banyaknya masaalah kerohanian, moral dan sosial umat hari ini memerlukan satu penyelesaian yang efisien dan mantap. Masjid berpotensi besar untuk menjadi penyelesai kepada masalah yang dihadapi oleh umat dan ini memerlukan persiapan-persiapan struktur, organisasi dan pentadbiran yang cekap dan efisien.<sup>24</sup>

Masjid mampu memainkan peranan yang utama dan berkesan di dalam menyatukan dan memupuk perpaduan masyarakat Islam. Juga di dalam hubungan dengan mereka yang bukan muslim di kalangan masyarakat majmuk. Perkembangan teknologi maklumat perlu dimanfaatkan oleh institusi masjid demi untuk menyempurnakan perlaksanaan fungsinya dengan berkesan. Bagaimana ianya dapat dimanfaatkan akan diterangkan di bawah.

## Saranan

Berdasarkan fakta yang dapat dikumpulkan daripada kajian seumpamanya, maka satu polisi atau dasar jangka panjang perlu di sediakan. Di dalam mengambil peluang kerancakan dunia tanpa sempadan dalam era globalisasi, masjid dapat memainkan peranan yang besar di dalam memandu umat Islam ke arah jalan yang lurus. Dr Muhammad Uthman telah mencadangkan beberapa langkah yang bertujuan untuk memperbaiki keadaan buat sementara waktu yang boleh di laksanakan, antaranya:<sup>25</sup>

- Di dalam mengoptimumkan kemajuan teknologi maklumat, institusi masjid seharusnya dilengkapi dengan alat pendidikan seperti komputer, LCD, CD ROM dan alat pandang dengar yang canggih. Dengan cara ini penyampaian ilmu dan proses

pembelajaran akan lebih berkesan. Pendidikan dengan penggunaan alat multi media, dewan kuliah dan dewan persidangan yang lengkap dengan *simultaneous translation* amat berguna terutama di dalam penyampaian ceramah atau majlis ilmu yang disampaikan oleh penceramah jemputan dari luar negara. Masjid juga harus memanfaatkan sistem sidang video yang membolehkan ceramah dan majlis ilmu di buat secara langsung.

- Maklumat tentang penduduk dan keluarga mereka di dalam sesebuah kariah masjid dapat dikumpulkan dalam satu sistem maklumat komputer dan seterusnya dihubungkan dengan satu kariah ke satu kariah yang lain melalui jaringan Internet dengan laman web sendiri. Dengan cara ini pertukaran maklumat antara satu masjid dengan satu masjid yang lain dapat di buat dalam usaha untuk mempertingkatkan syiar Islam.
- Penyusunan semula tugas pegawai-pegawai dan AJK masjid adalah perlu demi untuk menentukan masjid dapat memainkan peranan yang lebih berkesan sejajar dengan perkembangan semasa. Mereka yang dilantik hendaklah bukan sahaja berilmu tetapi komited di dalam bidang tugas mereka. Satu formula perlu dicari untuk meningkatkan prestasi mereka yang bertugas di masjid termasuk mengadakan kursus-kursus khas di dalam aspek pentadbiran dan penyelidikan.
- Merapatkan masyarakat masjid dengan masyarakat sekolah dan hospital. Masjid dijadikan sebagai pusat sumber ilmu dengan kelas-kelas tuisyen dan aktiviti sosial yang lain. Klinik Islam dan kemudahan perubatan dengan bayaran yang berpatutan akan menggalakkan masyarakat untuk mengunjungi masjid.
- Menjinakkan para belia dan belianwanis dengan masjid dan menjadikan masjid sebagai pusat riadah dengan beberapa kemudahan rekreasi dan sukan. Bila terdengar azan berkumandang, mereka diajak untuk bersolat berjemaah dan mendengar taskirah pendek. Ini secara tidak langsung akan menyemai budaya cintakan masjid dan kenangan ini akan dibawa ke mana-mana hingga mereka dewasa.

<sup>24</sup> Ibid.Routledge, London, 1992, hal 195-196.

<sup>25</sup> Dr Muhammad Uthman.

- Tadika Islam di kawasan masjid merupakan salah satu dari usaha untuk membiasakan kanak-kanak Islam sejak kecil dengan suasana masjid. Kesan suasana ini akan membantu membentuk personaliti mereka dengan format dan budaya Islam hingga mereka dewasa nanti.
- Majlis perkahwinan serta majlis keraian yang lain yang sesuai boleh diadakan di kawasan masjid dengan syarat mereka mengikuti hukum syarak. Majlis aqad nikah di dalam suasana rohani yang bersih dan jernih akan bakal melahirkan generasi Islam yang bertaqwah. Secara tidak langsung akan menjimatkan belanja dan akan dapat merapatkan hubungan silaturrahim di kalangan masyarakat bila majlis diadakan secara bergotong-royong.
- Masjid dijadikan pusat sumber dan gedung ilmu. Bahan-bahan rujukan yang sistematik yang disimpan di dalam CD-ROM serta buku ilmiah yang tersusun rapi yang mampu di akses oleh pelajar-pelajar tua dan muda. Kurikulum pendidikan masjid dikemaskinikan dengan berdasarkan input yang mampu menarik minat semua peringkat umur.
- Khutbah-khutbah tidak hanya dibaca melalui teks-teks secara monolog tetapi harus dihayati dan disampaikan oleh khatib dengan fasih, lantang dan meyakinkan, mahir, berseni dan tidak hambar. Justeru itu, perlu ada satu maktab khas untuk melatih khatib di dalam aspek penyampaian khutbah dan '**Effective Public Speaking**' perlu diperkenalkan agar khutbah yang disampaikan lebih menarik dan menjurus kepada perkembangan semasa '**burning issues**'.
- Masjid hendaklah dijadikan sebagai apa yang dipanggil 'zon aman' di mana perbezaan politik berparti seperti yang berlaku sekarang hendaklah dihapuskan. Politik kepartian tidak akan dapat menyatukan umat Islam; lebih-lebih lagi wujudnya perasaan fanatik dan taksub kepada kefahaman politik masing-masing yang sempit. Masjid adalah diibaratkan seperti '**Masjid Al Haram**' di mana sesiapa yang memasukinya maka ia akan merasa aman dari sebarang gangguan.

## PENUTUP

Jika saranan-saranan di atas tidak diperlakukan, dibudayakan dan dijadikan amalan sehari-hari masyarakat Islam, maka Islam akan luntur dan institusi masjid akan hanya sebagai pusat adat ('ritual') sepertimana gereja di dalam agama Kristian. Bezanya cuma gereja berfungsi pada hari Ahad manakala masjid pula berfungsi pada hari Jumaat (mingguan), Hari Raya (tahunan) serta waktu solat harian sahaja.<sup>26</sup>

Peranan masjid mestilah ditonjolkan sebagai institusi untuk umum dan bukannya untuk sebilangan kecil umat Islam yang selalu dikenali sebagai orang masjid. Masjid mestilah dirasai bahawa ia milik umat, kecil-besar, tua-muda, miskin-kaya, wanita dan lelaki, golongan terpelajar dan sebagainya. Inilah salah satu aspek kegagalan masjid di zaman ini di mana masjid menjadi tempat aktiviti sebilangan kecil umat tanpa disertai oleh golongan masyarakat yang lain.<sup>27</sup>

Perlu juga disebutkan bahawa masjid tidak akan berperanan sekiranya AJK dilantik daripada golongan yang tidak melazimkan diri dalam solat berjemaah dan aktiviti-aktiviti masjid. Masyarakat akan memandang dingin kepada segala aktiviti masjid sekiranya AJK masjid sendiri pun tidak pernah menghadiri sama ada solat jamaah atau aktiviti-aktiviti yang lain. Masjid tidak akan dapat berperanan sekiranya pendokong dan pegawaiannya tidak memenuhi roh dan semangat masjid, iaitu memakmurkan 'rumah Allah'.<sup>28</sup>

Masjid mestilah berperanan secara lebih aktif bukan sebagai untuk mengadakan kuliah-kuliah pengajian sahaja tetapi juga untuk menarik perhatian sebahagian besar masyarakat yang lain, supaya berminat untuk hadir ke masjid untuk tujuan-tujuan ibadah, kenduri-kendara, kuliah-kuliah, aktiviti-aktiviti sosial dan kemasyarakatan dan sebagainya. Masjid disamping menjadi tempat ibadah dan kuliah juga menjadi satu institusi dakwah dan penyambung silaturrahim di kalangan masyarakat Islam di dalam suasana yang tenang, mesra dan '**therapeutics**'. Kesemua ini memerlukan kepada pegawai-

<sup>26</sup> Mohd Rejab Hj Ahmad, Peranan dan Beberapa Isu Masjid.

<sup>27</sup> Dr Mohd Daud Bakar, Memakmurkan Rumah Allah, Dakwah, September 1995.

<sup>28</sup> Ibid.

pegawai, AJK, kelengkapan dan pembinaan masjid yang menjurus ke arah peningkatan masjid daripada tempat yang eksklusif kepada tempat yang menjadi tambatan hati sebanyak mungkin lapisan masyarakat Muslim. Dengan ini masjid akan berperanan dengan ertikata yang sebenarnya bukan sebagai '**peti sejuk**' yang membekukan minda dan fikiran umat Islam.<sup>29</sup>

Fahaman sekularisme yang memisahkan agama dari urusan hidup; memisahkan ibadah daripada pentadbiran, masyarakat, ekonomi, politik dan sosial dan memisahkan masjid dari lain-lain institusi dalam negara adalah satu fahaman yang terpesong dan menyesatkan. Fahaman Islam yang sebenar secara integrasi, mencantumkan ibadat dengan berbagai aktiviti-aktiviti hidup, malahan memperluaskan skop ibadah hingga merangkumi hampir kesemua urusan hidup manusia.

<sup>29</sup> Mohd Rejab.

Umat Islam seharusnya mempunyai daya ketahanan nasional, individu dan ideologi kendiri di dalam membuat penapisan kepada nilai-nilai luar yang negatif hasil dari dasar **keterbukaan** dan **pensejagat** yang di bawa oleh konsep globalisasi. Umat Islam perlu berubah dengan pemikiran baru supaya paradigma peranan dan fungsi masjid boleh diperbetulkan dan diubah. Masjid hendaklah dijadikan pusat perkembangan ilmu dan pemikiran Islam yang dapat mencerna cara berfikir umat Islam supaya lebih terbuka dan global, tidak jumud, bersikap yakin, jati diri dan saksiah di dalam beragama dan mengutamakan tidak hanya kecemerlangan dunia tetapi juga kemaslahatan akhirat.<sup>30</sup>

<sup>30</sup> Haji Kamaluddin M Zin, *Siapa Perancang Aktiviti Masjid?*, Ketua Pengarang Majalah Dakwah, September 1995.

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Lt Kol Murtadza Hj Noordin telah ditauliahkan ke dalam Kor Armor DiRaja pada 27 Jun 1981. Beliau pernah memegang berbagai jawatan penting seperti Ketua Jurulatih dan Timbalan Komandan PULAMOR. Beliau pernah bertugas sebagai Pegawai Pemerhati Tentera (UNMO), UNTAC, Kemboja pada tahun 1992. Beliau memiliki ijazah Sarjana dalam bidang Pengajian Strategik dan Pertahanan, dan Diploma Pengajian Syariah dari Universiti Malaya. Beliau pernah dianugerahkan sebagai **Tokoh Wira Maal Hijrah ATM** sebanyak dua kali iaitu pada tahun 1996 dan 2003. Beliau juga pernah dinobatkan sebagai **Wartawan Tentera Terbaik**; Pertandingan Anugerah Media Pertahanan 2005. Beliau kini bertugas sebagai Pegawai Memerintah Rejimen Pertama Kor Armor DiRaja.

# INFORMATION WARFARE



By Mej Mohd Roziman bin Zainal

## Introduction

Information Warfare, in its largest sense, is simply the use of information to achieve our national objectives. Like diplomacy, economic competition, or the use of military force, information in itself is a key aspect of national power and, more importantly, is becoming an increasingly vital national resource that supports diplomacy, economic competition, and the effective employment of military forces. Information warfare in this sense can be seen as societal-level or nation-to-nation conflict waged, in part, through the worldwide internetted and interconnected means of information and communication. What this means is that information warfare, in its most fundamental sense, is the emerging “theater” in which future nation-against-nation conflict at the strategic level is most likely to occur. Information warfare is also changing the way theater or operational-level combat and everyday military activities are conducted. Finally, information warfare may be the theater in which “operations other than war” are conducted, especially as it may permit the United States to accomplish some important national security goals without the need for forward-deployed military forces in every corner of the planet. Information warfare, then, may define future warfare or, to put it another way, be the central focus for thinking about conflict in the future.

Information warfare, in its essence, is about ideas and epistemology- big words meaning that information warfare is about the way humans think and, more important, the way humans make decisions. And although information warfare would be waged largely, but not entirely, through the communication nets of a society or its military, it is fundamentally not about satellites, wires, and computers. It is about influencing human beings and the decisions they make. The greatest

single threat faced by the Air Force, and by the services in general, as we begin to think about information warfare is that we will yield to our usual temptation to adopt the new technologies, especially information technologies, as merely force multipliers for the current way we do business. It would be a strategic mistake of historical proportions to focus narrowly on the technologies; force the technologies of information warfare to fit familiar, internally defined models like speed, precision, and lethality; and miss the vision and opportunity for a genuine military revolution. Information warfare is real warfare; it is about using information to create such a mismatch between us and an opponent that, as Sun Tzu would argue, the opponent’s strategy is defeated before his first forces can be deployed or his first shots fired.

The target of information warfare, then, is the human mind, especially those minds that make the key decisions of war or peace and, from the military perspective, those minds that make the key decisions on if, when, and how to employ the assets and capabilities embedded in their strategic structures. And while the concept of information warfare in its computer, electronic warfare, and communications net version is most familiar in military operations involving traditional state-to-state conflict, there are new and dangerous players in “cyberspace”—the battlefield for information warfare. There has been a proliferation of such players—non-state political actors such as Greenpeace, Amnesty International, rogue computer hackers like the Legion of Doom, some third world “rebel” who stages a “human rights abuse” for the Cable News Network (CNN), or ideological/religious inspired terrorists with easy access to worldwide computer and communications networks to influence, to exchange information, or to coordinate political action on a global basis. All of this suggests that

the military or governments of a traditional nation-state may not be the only serious threat to our security or the driver of our national security politics. Cyberspace may be the new “battle space,” but the battle remains the battle for the mind. There must be no confusion of the battle space with the battle.

### What is Information Warfare?

Information Warfare involves achieving and maintaining an information advantage over competitors or adversaries. Since competitive advantages can impact an organization's success or failure, it is important to understand the factors that affect this balance, and to understand the framework created by the new technologies and the new paradigms. Information Warfare in its broadest sense is a struggle over the information and communications process, a struggle that began with the advent of human communication and conflict. Over the past few decades, the rapid rise in information and communication technologies and their increasing prevalence in our society has revolutionized the communications process and with it the significance and implications of information warfare. Information warfare is the application of destructive force on a large scale against information assets and systems, against the computers and networks that support the four critical infrastructures (the power grid, communications, financial, and transportation). However, protecting against computer intrusion even on a smaller scale is in the national security interests of the country and is important in the current discussion about information warfare.

Martin Libicki(1), a senior fellow at the Institute for National Strategic Studies, National Defense University, says that Information Warfare is not “a separate technique of waging war.” Rather, there are seven distinct forms of Information Warfare, each involving the protection, manipulation, degradation and denial of information. These forms are:

- a. Command and control warfare, which is to separate the enemy's head from the body of his forces.
- b. Intelligence-based warfare, which consists

of measures and countermeasures that seek knowledge to dominate opponent's combat power in the battle space, and combat power potential outside the battle space.

- c. Electronic warfare, such as radio-electronic or cryptographic means.
- d. Psychological warfare, used to influence the minds of friends, neutrals and foes.
- e. “Hacker” warfare, in which computer systems are attacked.
- f. Economic information warfare, blocking or channeling information to pursue economic dominance.
- g. Cyber warfare, a futuristic collection of ideas that ranges from clever to absurd.

### Definition of Information Warfare

It seems as if we have always been engaged in some form of Information Warfare , regardless of what terms may have been applied at the time. For some, Information Warfare means high-tech devices for sensing, computing and communicating digital information, and converting it to targeting data for use by artillery, missiles or other weapon systems, or to improve command and control of battlefield operations. To others, Information Warfare is more traditional, more “low-tech,” involving propaganda, psychological and deception operations to deter, confuse, delay or surprise an enemy.

What exactly is Information Warfare? There are a few definitions given to describe Information Warfare. The USA Joint Chiefs of Staff (2) define Information Warfare as ***actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems, and computer based networks while defending one's own information, information based-processes, information systems and computer-based networks.***

Meanwhile, The Brown Commission (3) defines information warfare as ***activities undertaken by government, groups, or individuals to gain***

**electronic access to information systems in other countries ... as well as activities undertaken to protect against it.** Other expert, King (4), defines Information Warfare as **a conflict between two parties where IT is the primary means of obtaining a defensive or offensive advantage.** The following definition of Information Warfare is given in the Cornerstones (5): **...Information Warfare is any action to deny, exploit, corrupt or destroy the enemy's information and its functions; protecting ourselves against those actions and exploiting our own military information functions.** Charles F. Hawkins (6) define Information Warfare as **a feature of military conflict where information systems are attacked or defended, directly or indirectly as a means to dominate, degrade or destroy, or protect or preserve data, knowledge, beliefs or combat power potential.**

### Understanding Information Warfare

Before we try to understand about Information Warfare, we should identify whether Information

Warfare is art or science? Is it technology-driven, i.e., more hard-science than art? Or is it oriented toward human behavior - the value-set of commanders, the beliefs of troops - making it more art than science? These are two somewhat contrasting views that repeatedly emerge from contemporary writings on the subject of Information Warfare.

The human behavior dimension is distinctly related to the psychological operations aspect of Information Warfare, and so is command and control, at least in its human element. The technology aspect - communication systems, computers, electronic devices and counter-devices - appeal more to the hacker and electronic warfare forms, and also somewhat to intelligence (depending on whether it's HUMINT or SIGINT or ELINT) (7) and command and control warfare practitioners.

In fact, Information Warfare combines both art and science, much the same as warfare itself is both art and science. The following tables are illustrative:

Technology	Human Behavior
Electronics/optics	Culture
Signals	Beliefs
Radar	Leadership
Infrared	Will to fight
Computers	Morale
Lasers	Cohesion
Operational Analysis	Propaganda
Databases	Symbols
Statistics	Skill
Analytical methods	Civil-military relations

Table 1. Comparing Two Views of Information Warfare

Art	Science
Strategic level	Tactical/operational level
Social and behavioral	Sensors and communications
Command and control	Processing and analysis
Hard to quantify variables	Measurable, precise
Results uncertain	Deterministic

**Table 2. Is IW Art or Science?**

To understand Information Warfare, we need to appreciate what information is and what it isn't. Simply put, information can be the content or meaning of a message, or an element of a database. But information is more than that. Information has been called "a difference that makes a difference." A quick example will show what this means. Effective engagement of a target requires location and identification of the target, which must be accurate and precise. The information must be relayed to a weapon system that will engage the target. Other parameters are also important, such as target vulnerability (e.g., thickness of armor or fortification), speed, direction of movement, and time of sighting. The weapon system used to engage the target must not have higher priority missions at the time and it must be within range, have the correct ordnance, etc. Practically any one of these information pieces, if it is wrong or delayed, can be the "difference that makes a difference" in effective engagement of the target. In other words, we want information that is worth something, not just bits of radio traffic coming over the airwaves.

In the larger sense, information is processed and used by information systems. These can take various forms:

- a. Human interaction
- b. Self-interaction
- c. Man-machine interface
- d. Electro-mechanical
- e. Hierarchical structure
- f. Network structure
- g. Any combination of the above

Some information systems are human behavior-based, others are technology-based, and often these systems are hybrids or combinations. The key role of technology in Information Warfare is several-fold: greater accuracy and precision in sensing; greater speed, data volume, range and multi-point dissemination of information; faster processing; and so forth. But technology still serves the human decision maker, who in turn is supported by information analysts.

However, rudimentary decision making is already being performed by machines. Modern fuses, in cluster bomb units for example, have basic IF, THEN, ELSE logic built in. For example, IF subjected to 250 pounds or greater pressure (from a tank tread), THEN detonate; ELSE wait (a specified period before self-destructing).

Collection, organization and analysis of information generate knowledge. In the case of the "smart" bomb fuse, enough knowledge to know when and under what conditions to detonate. In battle, knowledge is power. We equate knowledge to situational awareness. It is the domain of the decision maker the commander.

### Why Information Warfare is important?

The first answer to this question must be: Because people - knowledgeable military officers, United States Department of Defense officials and military strategists believe it is important. Whether it's really important or not is beside the point, but Information Warfare really is important, and has been an important element of warfare in various

forms for a long, long time. On occasion, Information Warfare has been decisive in battle or conflict, and it has almost always been at least somewhat influential. The thing that makes Information Warfare even more important today is that people believe it will become increasingly influential, even dominant, in the very near future.

There's another reason Information Warfare is important. Many defense analysts in the United States, China and elsewhere, are concerned about what is called a Revolution in Military Affairs (RMA).<sup>(8)</sup> Although RMA is focused on equal parts of doctrine or military thought and on organization, technology and operations, most of the attention seems to be paid to the technology aspect. There are a number of new or important technologies. The U.S. Army's topology of technologies lists eight technology areas that are important to its interests and future requirements.<sup>(9)</sup> Professor Walt Rostow<sup>(10)</sup> says that there are four technologies that are potentially revolutionary: microelectronics (including robotics), optics (including lasers), micro-biotics, and advanced materials. Each of these has direct applicability to military functions and operations (e.g., in order, UAVs and guidance systems, target detection and acquisition, battlefield medicine, stealth machines). Two of these technology areas, microelectronics and optics, relate directly to information in terms of its generation, transmission, computation, organization, analysis and dissemination. So, if there's a revolution going on in military affairs, then information is certainly a part of it. Some people even refer to the current era as the Information Age, as distinct from, say, the Industrial Revolution or the Nuclear Age.

In any event, Information Warfare has become a part of the modern military fabric, and it important for us to try to understand it better.

### Elements of Information Warfare

With the increased value of information comes the need to approach it in new ways. Information Warfare has many aspects. To appreciate these it is important to discuss Information Warfare from several perspectives which may be thought of as the constituent elements:

a. **Information Collection** - An organization needs a variety of information to support its operations. These needs include planning its activities, executing its plans, monitoring its progress, and reporting its results. Information collection includes the entry points for information into an organization from both internal and external sources. Issues include quantity (completeness), quality (accuracy), and timeliness of this information. Business examples of collection systems include point-of-sale (POS) systems, market surveys, government statistics, and internal management data.

b. **Information Protection** - Once information is collected by an organization, the next logical consideration is how to protect it. The vulnerability of the "Information Infrastructure" is widely discussed and publicized and is one important aspect of protection. Information protection addresses two types of threats: information compromise and destruction. Compromise involves a competitor gaining access to an organization's proprietary data. Destruction involves the loss of these data (or loss of access to these data) as the result of a hostile attack by an adversary.

c. **Information Denial** - Information denial includes measures beyond normal protection to specifically target an adversary's collection systems. There are two types of denial: direct attacks on the adversary's information systems, and providing misinformation to its systems to deceive and induce the adversary to take actions that are not to its advantage.

d. **Information Management** - An important element of Information Warfare is information management. The underlying concept is that with the increasing value of information in business, a competitive advantage can result from improved management of this resource. There are many aspects to this element including the selection and introduction of information technologies and the methods for controlling data within information systems. The decentralization of

computing and data resources within organizations has created many issues for corporate data managers, including questions of "Where is the data?", "Who has it?", and "Which version is the most current?" Other issues include deciding which data to retain (archive) for future reference, and how to store these archived data so that they will be readable by future systems. As an organization's intellectual property exists increasingly in electronic forms, it is harder to manage using traditional methods (such as paper records) and may be more easily misplaced, lost or discarded. Automated solutions are important elements.

**e. Information Transport** - An essential element of Information Warfare is information transport. The speed with which this is done affects the timeliness of the data availability and therefore the responsiveness of the organization to situations. Since this responsiveness can be a big factor in the competitive process, the speed and efficiency of an organization's transport capabilities can be an important factor in the organization's survival or failure. Competitive transport systems must be fast, reliable, and controlled. Transport considerations must be viewed within the overall Information Warfare perspective, since the same efficiency that facilitates rapid message and data transportation also may be used by a competitor to download proprietary data bases in seconds or minutes.

## Information Warfare Typology

### Offensive and Defensive

Information Warfare can be offensive or defensive, although, understandably, the former has attracted the lion's share of the attention. It may be a stand-alone activity, or a precursor of, or complement to, conventional military operations. Offensive Information Warfare comes in various guises. At its most pedestrian, Information Warfare involves the targeting

of physical assets with the goal of destroying or diminishing by bombing, for example, critical elements of the enemy's command, control, communication, computer and intelligence (C4I) capability. Alternatively, the goal may be to infiltrate imperceptibly an adversary's information systems in order to corrupt the information content or significantly degrade the system's performance. The target may be a military computer cluster or, equally, a component of the civil/national information infrastructure.

Defensive Information Warfare is concerned with threat assessment (who has the technical means, motive and opportunity to launch an attack?) and threat containment (how can the risk of attack be minimized, the threat preempted?). Simply put, the objective is to reduce the risk of incursion by outsiders and simultaneously reduce the organization's vulnerability to "corrupted insiders" – fifth columnists within the fold – the source of many attacks. Defensive Information Warfare has both technical and social aspects. Technical dimensions of defensive Information Warfare include robust firewalls, strong encryption, integrity testing and cyber-forensics (digital detective work following a hack/attack). It can also include hiring "ethical hackers" (often individuals with a military background) or, alternatively, former hackers to act as security consultants, an information age instance of the poacher turned gamekeeper. However, the latter practice is frowned on in some quarters (11). Social factors include risk assessment, education and training. Finally, it may also include counterintelligence activities designed to prevent routine security lapses and make break-ins by external groups or unauthorized insiders harder to achieve.

### The spectrum of possibilities

**a. Level 1-Information Warfare** - a staple of industrial age warfare, seeks to damage or destroy the equipment (tangible assets) associated with command, control and communication functions (like computer systems, data networks) through the use of brute force. This is not, strictly speaking,

an instance of “soft-war” or “software warfare”, and probably should not be included under the Information Warfare rubric.

b. **Level 2-Information Warfare** - seeks to prevent the selected target from operating effectively by, for instance, launching a denial of service attack. This may range from being merely irritating – defacing the Pentagon’s or Central Intelligence Agency’s (CIA’s) Web site, as has already happened) to mission critical (cutting off computerized intelligence systems supporting troops in the battle theatre).

c. **Level 3-Information Warfare** - typically, seeks to degrade, or corrupt the content of a target’s information systems using some kind of malicious software, occasionally called “mal-ware”. An example would be hacking into the enemy’s logistics support system in order to induce performance degradation, or to destroy the content of the system’s constituent databases, such that the target’s ability to marshal physical assets in the operations theatre was seriously impaired.

d. **Level 4-Information Warfare** - involves infiltrating a target’s information resource base in order to conduct espionage and support intelligence-based warfare, generic practices which have a considerable pedigree in military and diplomatic history. It does not entail destruction or direct conflict between the opposing parties.

e. **Level 5-Information Warfare** - entails silent penetration of a target’s systems to shape opinions, manage perceptions, or foster deception using digitally-enabled techniques such as superimposition or morphing: are we, in fact, looking at Slobodan Milosovic on TV; are those images of a downed US F16 fighter plane real or digitally mastered? In this instance, the aim is not to render the system inoperative or obliterate the system’s information content, but to play what might be termed “mind games”, the kind of practices implied earlier by the phrases neo-cortical and epistemological warfare. With this kind of “soft-war”, the aim is to be silent and invisible, leaving no external trace of the incursion and manipulation.

## Concepts in Information Warfare

### Fundamentals

The concept of Information Warfare has been well documented (12). By definition, the fundamental weapon and target in Information Warfare is information. It is the product that has to be manipulated to the advantage of those trying to influence events. The means of achieving this are manifold. Protagonists can attempt to alter data directly or to deprive competitors of access to it. The technology of information collection, storage and dissemination can be compromised. Using other, subtler techniques, the way the data are interpreted can be changed by altering the context that in which they are viewed.

Whilst Information Warfare has been linked with military matters, its relevance in commerce, government and private lives cannot be ignored. In this information age, the use of technology as a means of communication, and data storage and presentation has exposed us all to a level of data manipulation and deprivation not experienced before. The principles of Information Warfare are not new, even of the techniques are. The two fundamentals of strategy are force and deception; in Information Warfare both can be used. Flooding an e-mail server with messages to cause a denial of service might be a brute force attack, while subtly altering a Web page is a deception.

### Data, Information and Knowledge

The conventional way to define data, information and knowledge is in a linear fashion. Data describe attributes of things; information is collated data in context, and knowledge is information, which has been interpreted in the light of experience, etc. In Information Warfare context, a more useful definition can be found in the model proposed in Figure 1. It is based on the work of Boisot (13). In his model, data is associated with a thing and discriminate between different states of the thing they describe. They consist of attributes of the events objects they describe. On the other hand,

knowledge is an attribute of an agent, normally this means a human. Knowledge is a set of interacting mindsets about data activated by an event.



**Figure 1: Relationship between data, information and knowledge**

Information is the set of data filtered by the agent within the bounds of the knowledge held by the agent. It establishes a link between the agent and the data. The definition of data is fairly simple to understand. Events or items have attributes and descriptions of these attributes are data. However, a human agent decides knowledge. It is established by the history of the person (for example, by education, culture, age, gender the mood of the person) and the context of the problem at hand. It is this characteristic which makes the idea of “truth” in information problematic. There might be general agreement about data.

### Basic strategies used in information war

Using the model developed above, the basic tactics can be shown. Figure 2 outlines the main attack strategies. From this, it can be determined that if the target is the data, a number of things can be done:

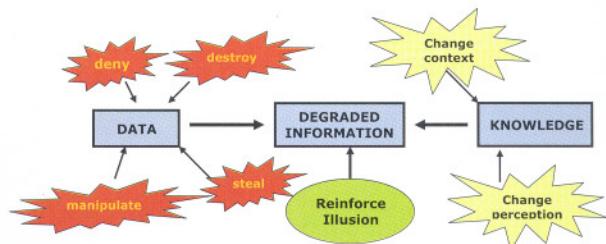
a. **Deny or disrupt access to data.** This can be achieved by attacks on hardware or systems containing the data or its collection. As much as data have a temporal dimension, it could also involve the delaying of access to data to the point at which it becomes useless. These attacks can range from denial of service to the deliberate withholding of data.

b. **Destroy data.** Destruction of the data can occur by physical destruction of the storage medium, or the data itself, so it becomes irrecoverable in the time needed to make it useful. Of course, it can be argued that data are never destroyed, just the medium on which they are stored.

c. **Steal data.** Much corporate data is confidential and can also give competitive advantage. Theft of these data (and remember, theft of these data can go unnoticed as the victim could still have it) might give insights into the workings of the attacked thereby giving the attacker a possible business, negotiation or criminal advantage.

d. **Manipulation of data.** Data can be added, deleted or amended to give the attacker advantage. A person committing fraud would often use this method.

The strategies to deal with the knowledge (that is, the human) component of information production are basically twofold:



**Figure 2: Basic tactics used in information warfare**

- Change the context in which data are interpreted.
- Change the perceptions of the people to that data.

Both of these ideas are closely related. The real difference is that with changing the context, you are trying to alter the situation in which the data are viewed. This can include such things as place, sensory surroundings, and political climate. However, changing perceptions is directed more toward the people themselves and their thought processes. This can include public relations, advertising and incentives. The assumption is that the attacker will exploit any situation created by the attack. It is also assumed the victim will attempt some defense.

Of course, these processes are not “one offs”, and any “illusion” created by the attacker should be maintained to ensure its credibility.

A brute force denial of service attack may not be subtle. Hence, it does not need much reinforcement. However, a more subtle deception involving data manipulation may need continual reinforcement by more false data or contextual stimulation.

It needs to be emphasized that Information Warfare tactics should ensure the data are used to full advantage. Information Warfare is not just about depriving an adversary of data, but also about exploiting one's own. The aspects that deal with perception management are about managing the adversary and also internal awareness.

### **A framework for an information attack**

Denning (14) outlines the potential elements in information systems that are prone to attack and exploitation as:

- a. Containers (stores of data): for example, computer and human memories.
- b. Transporters (conveyors of data): for example, humans, and telecommunication systems.
- c. Sensors (input devices to the system): for example, scanners, cameras, microphones, human senses.
- d. Recorders (output devices from the system): for example, disk writers, printers, human processes.
- e. Processors (manipulators of data): for example, microprocessors, humans, software.

### **Some specific techniques in information warfare**

There is a number of ways information, or information systems can be used to gain advantage over (or disadvantage to) another organization. Examples of some aggressive tactics are:

- a. Information can be manipulated, or “created” (disinformation) to provide the target or its environment (for example, clients) a perception that develops behaviors detrimental to the target, or beneficial to the attacker.
- b. Information can be intercepted, thus giving the interceptor an advantageous insight into the target's strengths, weaknesses and intentions.
- c. Information flows in the target organization can be disrupted or stopped, thereby interfering with the normal processes of the target producing an advantage for the attacker.
- d. A target organization can be “flooded” with information, thereby slowing or stopping effective processing or analysis of the incoming information.
- e. Information can be made unavailable to a target organization by destroying the storage medium, or cutting off the information source.
- f. Disrupting the availability of data or making the system produce incorrect/dubious output can lower the credibility of information systems.
- g. Confidential or sensitive information can be exposed to the public, clients, government agencies and so on, thereby embarrassing or in other ways harming the organization.
- h. Malicious code can be launched onto system components.

Although many information warfare tactics are fringing on the illegal, it cannot be assumed that there are not dangers in the cyberspace. In a recent survey of IT managers in Australia (15), 66 per cent thought there was no threat from competitors in this area. This trusting attitude is probably caused by a combination of an optimistic view of their competitors' intentions, a lack of knowledge of potential attack techniques and a narrow definition of

“competitor”. If a competitor is an entity that wishes to decrease your share of the market, or obtain the same resources your organization wants, then environmentalists will be the competitors of a mining or logging company, and criminal’s competitors to banks.

Threats to an organization can come from many sources. They range from internal threats from employees to nation states or national intelligence agencies seeking to commit economic disruption or industrial espionage. Organized criminals or terrorist groups can also be threats to organizations. It is not good information security practice to assume that these threats are of no concern to the organization in question.

The form of attack can be varied. It depends on such factors as the medium of information transfer and storage (for example, electronic, telephone, verbal, facsimile, etc.), the legality of the attack and the technology used (for example, electronic surveillance, computer viruses, and human senses). The motivation of the attackers also needs to be taken into account. Obviously some organizations have more potential than others. For example, it is more likely that sophisticated, economic espionage be practiced on a leading edge technology company than a small, local store. However, the consequences, in relative terms, can be just as catastrophic for the store if any disruption is successful. Small stores have “enemies” as well.

### **Devastating potential of information warfare on a nation's economy**

The potential harm that can be done by damaging information infrastructures is great, much larger then most people think. The potential power of these information warfare weapons can be related to the technologies of nuclear warfare. There have been already incidences reported where information warfare has been deployed in some primitive forms. The possession of these potentially destructive weapons threatens the national security of

many nations and gives terrorist groups a powerful weapon. It is even possible for various public information systems (banks, financial institutions, cities etc.) and electrical and water systems of a nation to be brought down causing much internal havoc, and possibly shutting down the national economy.

Most computer virus infections are now transmitted via e-mail attachments. Recent virus attacks highlight the difficulty of securing systems against new threats. Some organizations have been overwhelmed with e-mail messages crashing their systems and losing huge amount of data: “Virtual corporations, electronic transactions, and economies without inventories – based on just-in-time deliveries – will make attacks on data just as destructive as attacks on physical inventories. **“Bytes, not bullets, are the new ammo or, most dramatically, a combination of bytes, bullets, and bombs”** (16).

We are rapidly moving beyond securing information into defending our systems from information warfare. Widespread computer access has exposed our systems to spies, adventurers, saboteurs and mercenaries. Information wars are always targeted against basic data-oriented economy systems such as banks, insurance companies, financial institutions, electricity and water systems. If these systems are attacked, it could be devastating because it will have direct effect on the national economy. A few countries have already experienced this warfare as they found that their Web sites on various systems were attacked, upsetting government, businesses and news-media servers (17). The US military has publicly announced the formation of information warfare units to protect national infrastructure of telecommunications, transportation, emergency services, energy and financial industries (18).

### **Types of information warfare attacks**

Information warfare stems from the dependence of businesses, organizations and governments on IT and the Internet. Once the attackers find a route through the Internet to

<b>TYPES</b>	<b>CAUSES</b>	<b>EFFECTS</b>
Human Engineering Attacks	Stolen Passwords	Destroy data, files, etc
Trap doors through e-mail viruses	E-mail attachments	Destroy data, files as well as captured sensitive information's
Cell phones satellite infrastructures	Infrastructure hired from other companies	Sniffing, eavesdropping
TV information manipulation	Manipulation of TV images	To create biased opinions
High energy radio frequency weapons	Offensive warfare	Destroying electronic devices
Denial of services attacks	Offensive warfare – mail bombing	Disk may run out of space, network connection may go down and computer systems may crash
Attacking power controls and communication links	Break in through stolen password	Destroy anti aircraft and radar systems
Satellite imaging and tracking systems	Break in computer systems	Destroy Satellite imaging and tracking systems
Attack on ISP's and ASP's	IP spoofing, DNS spoofing	Re-directing Web traffic
Political spamming	URL hacking or Web spoofing	Changing website contents

Table 3: Identifying various forms of Information Warfare attacks

intrude into the computer systems of the enemy, they can alter information or can shut down the system, destroyed by infiltration and distribution of various viruses into the systems resulting in stopping the business activity. Information warfare is not just a war about hacking; Information warfare is far broader and requires a detailed understanding of entire information infrastructure (19). There could be many different types of information war attacks, a few of them are mentioned in Table 3 below.

#### How to defense? - A framework for securing information infrastructure from information warfare attacks

Information warfare is definitely a concern for most nations, as can be seen by the large number of nations researching and developing offensive as well as defensive information warfare systems. Since attackers attack defense databases, smart weapons, satellites, intelligence, public affairs and psychological operations, these infrastructures demand

a security cover to protect them. First, nations have to build a security shield to defend their own information infrastructures before they prepare weapons to affect adversaries' information infrastructures. Many governments are worried that hired manpower from different countries will become infiltrators who can build secret trap doors during their work (20). Firewalls, encryption technology, authentication devices, vulnerability checking tools and other products can all offer improved security, but even these systems are susceptible to attacks (21). Protection techniques must be designed to guard hardware, software and user data against threats from both outsiders as well as from malicious insiders.

Safeguarding information infrastructures systems is becoming increasingly challenging as new technologies are evolving and attackers are inventing new systems. Even today's best security procedures may become inadequate for threats that might appear tomorrow. So, although the line between cyber-crime and

information warfare often blurs, what separates the two is that the latter is state or nation sponsored. Today, for organizations, the basic concerns are protecting secure commercial information, banking transactions and other sensitive data in an increasingly digitized world from such info war attacks (22) because information warfare make the issues of confidentiality, integrity, authentication and non repudiation much more critical than before. Effective intrusion detection capabilities remain elusive as information environments become more complex and attackers continually invent new techniques to overcome innovations in anti-intrusion and security systems.

Organizations have started taking utmost care to understand the measure needed to protect and safeguard their information infrastructures. However, at present, this information warfare - related disputes are fought *ad hoc* as the entire approach is cure-based and not prevention-based. Unfortunately, instead of utilizing a pro-active approach and preventing attacks, many companies allow them to happen and then search for remedies. Some researchers recommend that nations develop intrusion systems with a strategy to protect, detect and react to information warfare (23).

The framework proposed in this section, if taken into consideration, will prepare organizations and nations to protect their systems at all levels against any attacks. Most research work in intrusion detection has focused on the network or the individual computer host. An intrusion detection system mechanism should be able to generate alert signals so that resources like computers, networks etc. can be shut off or disconnected (24).

The proposed framework suggests the potential layers (zones) of information warfare attacks. In this framework, it recommends that intrusion detection systems should consider the entire chain of distributed objects that could be vulnerable to information war attacks. Each potential layer of information warfare is briefly discussed below:

a. **Application layer** - This is the most

vulnerable layer as the majority of attacks experienced are virus infections transmitted via e-mail attachments. Any e-mail attachment, Trojan horse, or trap door that is malicious and can damage the systems has to be identified before it gets activated. Presently, most of the systems use anti-virus software as a protection mechanism that is not a preventive measure. Newer kinds of effective intrusion detection methods are needed.

b. **TCP/IP layer** - The TCP/IP layer is the most crucial layer to provide network connectivity. It is also very vulnerable since it has a role to provide connection and deliver packets from source to destination. Most of the attacks take place at the TCP/IP layer level targeted at high-speed routers. IP spoofing, DNS spoofing, and Web spoofing, are the kind of attacks that need to be prevented. Complex algorithms are needed to track any intrusion taking place at ISP/ASP level. It would be more desirable to protect ISP/ASP resources because if systems are compromised at this layer, all ISP/ASP resources can shut down causing a severe loss to the national economy.

c. **Network interface layer** - The network interface layer is responsible for physical connectivity of resources with the network. Here the targets are insecure operating systems, file systems or network configurations. Legitimate access to a computer system, cracking passwords, cookies, software agents and denial-of-service attacks etc. are the methods used to gain control over physical computer and network resources. Presently there are a few methods to block cookies or detect spying software agents, but they are not fail-proof. Denial-of-service attacks are the major threat at this layer. This is the very sensitive layer since it affects the databases, file systems and network resources. The intrusion systems here have to have a zero tolerance approach. The network layer should protect all the corporate resources within the network range. In case of any attack, the network should flash a message to all its stations that an intrusion

has taken place and automatically shut the important data resources.

- d. Lower communication links layer - The lower communication layer of telephone, cell phone and microwave link infrastructure is the backbone of the first three (above mentioned) layers. Intrusion detection techniques should able to isolate any bandwidth-related attack at this layer.
- e. Upper communication links layer - Power controls and communications system, international gateways and TV broadcast satellite communication layers should have detection mechanisms to protect the large infrastructure which governs the military, media, research and space shuttle computer systems etc.
- f. **Devices layer** - Home appliances, car, phone, airplanes all need to be protected against HERF weapons – that can disrupt or destroy electronics in networks by sending an energy beam at them.
- g. **Procedure layer** - Apart from the layers of framework, organizations must have proper internal audit procedures and these procedures should be followed to the letter and spirit regularly. Qualified security advisors should be identified who could advise on security policies and procedures that need to be followed. Further, close ongoing monitoring is required to verify that policies are being followed and are adequate. Security is to be seen as a continuing process and security procedures must periodically be reviewed and changed with the time such as password control procedures etc.

Unless nations began to secure all these layers and develop an integrated approach to safeguard against information war, any patch solution is not sufficient to protect against information warfare.

### **Safeguarding against information warfare attacks**

Several mechanisms exist to safeguard against information warfare attacks. Some

examples of such mechanisms are: firewalls, encryption, virtual private networks, anti-virus software, intrusion detection, single sign-on, public key infrastructure and certificate authorities. However, since hackers would try to invent newer and newer attacks, the security mechanisms need to be updated continuously (25). A few common mechanisms that could be used to safeguard the systems against information warfare attacks are briefly discussed below:

- a. **Making configuring management effective** - Many security holes in online environments are simply due to the lack of effective configuring management. Many organizations do not configure firewalls to block Internet control message protocol (ICMP) pings originating externally. Numerous attacks could be tunneled through in that protocol's echo reply. Organizations should also block outgoing ICMP pings to avoid distributed denial-of-service attacks (26).
- b. **Safeguarding the vulnerabilities at the operating system layer** - Operating system layer is one of the most important layers that have vulnerability at unused ports. All unused ports should be closed. The ports are software modules built in any operating system to enable data communication across the machines. For example POP3 or SMTP server ports need to be blocked if organizations are not running a mail server (27). One should not install the public Web server (PWS) feature of Windows unless an organization is hosting a Web site for your internal network. Through the PWS server, hackers can have access to the files on a server and possibly the rest of the network. Another possible measure could be to unload the virtual private networking (VPN) adapter. This will prevent any access point for outside users to gain access to network resources (28). Another proposition could be to enforce kernel-enforced controls at the operating system (OS) level. The controls implemented in the kernel cannot be overridden or

subverted from user space by any application or user. Kernel-enforced controls can prevent access control to the system resources such as files, processes and network connections, and even if application is compromised. Kernel-level controls can protect shared-memory segments, semaphores, message queues, sockets, network packets, network interfaces and routing-table entries etc. effectively against any compromise (29).

**c. Monitoring the network traffic analysis**

- Organizations can also adopt various intrusion detection products to monitor network traffic. Intrusion detection products can seek attack signatures and make sure ICMP echo replies conform to expected parameters and are not hiding distributed denial-of-service attacks. Numerous computer security providers are releasing new and upgraded intrusion detection systems (IDS). Like a burglar alarm, these systems have an automated method of monitoring network traffic, tracking unauthorized access, and isolating intruders from valuable information assets (30).

**d. Using proper public-key infrastructures**

- Organizations can use a PKI infrastructure for encryption of data that are transmitted over the network. A 128-bit symmetric and 1,024-bit RSA could be an effective measure to protect data from any hackers or breach (31).

**e. Using biometrics for accessing the systems** - New technologies such as smart cards and biometrics authentication are already becoming reality. Also since built-in camera features for facial recognition, fingerprint readers and smart card readers are available in a PC, biometrics could be used successfully to safeguard systems from any unauthorized access (32).

**f. Detecting network node intrusion** - Network node intrusion detection (NNID) technology is another way to detect intrusion. NNID software is installed on critical workstations and servers that monitor

network traffic specific to each computer. NNID is a combination of network and host-based detection technologies that perform packet analysis at the host level, and at network level. Internet scanners with smart intrusion detection capabilities are also available. Such smart intrusion detection systems utilize high sensitivity sensors to track electronic traffic passing through network applications and systems, detect differences in traffic patterns and identify hacking activities (33).

### Impact of Information Warfare

Earlier we discussed that Information Warfare is as old as warfare itself. But the early ideas about information were simple: know yourself, know your enemy, and know the territory and climate. Modern technology has increasingly influenced our ideas about information and this has had an impact on the battlefield.

The Revolution in Military Affairs (RMA) is an organizing construct that helps us examine the impact of Information Warfare in three dimensions: organizational, thinking (or doctrine) and technology (34). In this manner, RMA combines the "art" and "science" of Information Warfare.

Information Warfare has changed the way we think (doctrine), organize and fight. At the same time Information Warfare has made the battlefield smaller, but it has vastly increased the potential scope of battle and the tempo of battlefield operations. To further complicate matters, Information Warfare has introduced unbelievable "clutter" and chaos onto the modern battlefield.

**a. Thinking** - Information Warfare has influenced thinking in ways that are both positive and negative. A negative example is that American society has now become conditioned to believe that military technology (i.e., Information Warfare technology) can make wars "brilliant, bloodless, brief and a bargain"(35). Society's beliefs affect the way the military plans and prepares for future wars. Not surprisingly, there is a continuing emphasis

on modernization at the expense of other accounts, such as operations and maintenance. A positive influence of Information Warfare on military thought is that it encourages investigation and exploration into new and different operational and organizational concepts. For example, some thought has been given to organizing an "Information Corps" specifically to conduct Information Operations. Whether this kind of organization is ever created or not is less important than the fact that people are thinking about new ways to fight wars.

b. **Organization** - Military organizations have already reacted to Information Warfare in several ways. Organizations have dispersed over greater areas of the battlefield than previously thought possible. This has helped to decrease casualty rates, but it has also made coordination problems greater (36). However, the impact of terrain and weather remains important. Deserts aren't jungles or built up areas, and Information Warfare on the battlefield won't work quite the same or as well in most cases when the terrain becomes hilly, vegetated or subject to weather that might affect visibility.

c. **Operations** - The major impact of Information Warfare on operations should be to speed them up so that commanders can "stay inside" their opponents decision cycle during a battle. With increased OPTEMPO, however, command and control problems will become exacerbated. With time compressed and space enlarged, it is easy to see how this will happen.

But the real operational challenge to modern Information Warfare forces will be to "clean up" the clutter and chaos on the battlefield (or at least adapt processes and systems to make sense of it, discard what is worthless, and keep what is valuable). Too, terrain and weather will affect operations similar to the way they affect organizations.

### **Future Concepts of Information Warfare**

As we move into the future, there are some guiding elements that should be paid attention to regarding Information Warfare.

a. **Doctrine for Information Warfare** - Doctrine for Information Warfare, because it is relatively new, must represent the best thinking available. Thinking must also be flexible and alert to new conditions and new ideas. No one or thing can afford to be excluded until their ideas have been given a fair hearing or battlefield test. However, a caution: thinking, like organizations, tends to ossify over time. We have to wonder if our bureaucracy is too cumbersome to take full advantage of or appreciate the advances in Information Warfare technology and thinking. In this regard, Information Warfare necessarily places a premium on good leadership.

b. **Organization for Information Warfare** - Like thinking, organizations are resistant to change. Technology won't change the way the military is organized, it takes people and ideas to change organizations. It is not clear that Information Warfare has yet had a major impact on changing organizations, although there are certainly signs that a lot of thinking about change is going on. Some of the signs of organization adaptation to Information Warfare are seen in staff sections responsible for computers in addition to communications. The U.S. Air Force is probably farther ahead in thinking about Information Warfare than other services, and units at the squadron level are actively discussing, organizing and implementing Information Warfare methods into their daily operations. Some future thinkers, however, have also suggested that we might want to consider an "Information Corps" to address Information Warfare needs of the Total Force.

c. **Technology for Information Warfare** - The primary technology areas that are revolutionary today, according to Prof. Walt Rostow, are: optics (including lasers); micro-electronics (including robotics); materials; and micro-biotics. The keys to the successful application of these technologies to Information Warfare are speed, miniaturization, and data volume.

d. **C3I/RISTA, an Example of the Future** - C3I/RISTA is a term that embraces the entire range of information-gathering functions included under the acronyms for command,

control, communications and intelligence, and reconnaissance, intelligence, surveillance, and target acquisition. In the future a highly networked system will be needed to allow integration of these functions. The sensor segment of C3I/RISTA will include large numbers of optical, infrared, radar, acoustic, and radio-intercept receivers. Robot vehicles, either airborne or ground-mobile, will become increasingly important as carriers of in-theater sensors. They will be augmented by satellite-based sensor systems and systems operated by other services. The communications segment of C3I/RISTA must provide quick and secure transfer of information among all the various elements in the network. Preprocessing of sensor data within "smart" sensors (there's the leading edge of Knowledge Warfare again), wide-band communications at tera-hertz speeds, data-compression techniques, and network management will be among the technologies needed to keep up with this communications load. For the command and control segment of C3I/RISTA, battlefield management software will give commanders a familiar language and graphic context in which to view information, make command decisions, and have implementing orders distributed to appropriate units. Other important command and control aspects of a future C3I/RISTA network will be joint operability with the other services and fast, unambiguous IFFN (identification of friend, foe or neutral) for ground systems as well as aircraft (37).

## Conclusion

In the twenty-first century, information warfare is displacing the threat of nuclear war. Insiders as well as outsiders may exploit system vulnerabilities through stolen or broken passwords to gain access to computers and launch these attacks. Many nations have already experienced some form of information warfare attacks. Safeguarding information infrastructure systems from these attacks is becoming an increasingly challenging task.

Information warfare is definitely a concern for most nations as can be seen by the large

number of nations researching and developing offensive information warfare systems. The growth of networked, multinational organizations and e-commerce institutions worldwide has drastically improved their efficiency and effectiveness. As organizations depend more and more on these networks for day-to-day operations, disruptions in their operations can have dramatic negative effects. This sends alert signals to nations that they should think of protecting their information infrastructures resources.

Information warfare is here to stay. Information System Managers must be aware of offensive threats in order to keep from becoming hacker causality. Organizations must find way to take control of their networks to control the loss of critical information and trade secrets. Organizations must develop sound policies and be willing to support them, increasing the training provided to their users, increase the physical security posture and monitor their network system. Besides that, Government must establish effective laws and prosecute the individuals who dare write development and execute malicious code.

Future research should be directed to develop complex algorithms for detection and prevention of attacks at each layer level. To avoid system break-ins, it may be desirable that sensitive systems use more and more biometrics devices for login. Use of cryptographic could take care of eavesdropping or sniffing on the network. The present firewall approach is not sufficient to protect corporate network resources. Therefore, future research should be directed at developing newer approaches to secure information infrastructures from information warfare attacks.

This paper has highlighted some of the theoretical aspects of information warfare. It does not encourage their use, but merely illustrates what is possible. The world is still a competitive place. Information warfare tactics in some form have been used for millennia. The presence of criminals, terrorists, competitors, state security services, and malicious or curious individuals makes the information warfare threat to organizations a real one. The magnitude of threat has yet to be decided. Whilst the term is militaristic in tone, information warfare is of direct concern to us all.

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U.S. VII Corps stopped moving at night during the 100-hour ground war against Iraq because of coordination problems and the fear of units running into each other at night.

Star 21, Strategic Technologies for the Army of the Twenty-first Century



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# AREA STUDIES AND NATIONAL SECURITY – EAST ASIA



By Lt Kol Shamsirudin bin Mohd Shariff

## Introduction

After the Cold War and riding out the 1997 currency and financial crisis, East Asia economies have steadily recovered since 2000. The economic development that followed helped underpin regional stability. Cooperation among the countries in the region has increased in the course of struggle to tide them over the financial crisis, and various mechanisms that promote self-help and mutual assistance have been strengthened.<sup>1</sup> However, the security environment in East Asia as it stands now gives no grounds for optimism. A number of internationally important maritime trade routes, such as the South China Sea, the Malacca Straits and the Singapore Straits, run through this region, and maritime traffic passing through these routes have increased sharply as economic interdependence has grown stronger. Long-standing elements of instability unique to East Asia still linger on. Development and proliferation of nuclear weapons and ballistic missiles by North Korea is posing a serious threat to this region and the international community.<sup>2</sup>

The United States foreign policy is presently overwhelmingly focused on the global war on terrorism and the democratic transformation of Iraq and Middle East, Asia is undergoing its own transformation, driven in large part by China's economic dynamism and active diplomacy. They needed alliances in East Asia in order to contain the Soviet Union and communist China. When the United States foreign policy focus shifts back to Asia, it will encounter a significantly changed region. The situation is different today

because East Asia now becoming a region ongoing a process of deepening of economic, political, and cultural relations among them. There is also a growing enthusiasm for building regional organization.

This paper will highlight the importance of area studies of the East Asia region and the impact on their national security. This paper will also highlight the important role of the United States in stabilizing the region. In this study, East Asia states only refer to China, Japan, Korea and Taiwan.

## The Importance of East Asia Region

Dramatic changes in East Asia have put the region at the head of the world's strategic agenda. The region will be plagued by increasing insecurity; even those who disagree concede that East Asia's security problems have changed. The rapid economic growth of East Asia economies have increased the strategic important of the region. The trajectory of change in the region's strategic circumstances and security policies remain unclear.<sup>3</sup> From the Spanish-American War through the Cold War, the United States has understood that its security depends upon preventing any hostile foreign power or coalition from dominating the Asia-Pacific. American's alliances in the region and its military presence have provided a stable security structure for the region in recent decades. Of the Pacific Command's 300,000 personnel, almost one-third is forward deployed in permanent bases in Japan and South Korea.<sup>4</sup> The United States mutual

<sup>1</sup> Overview East Asia in 2004, 2005. *East Asian Strategic Review 2005*, Tokyo. The Japan Times, pp. 3.

<sup>2</sup> ibid. pp. 4-5.

<sup>3</sup> Michael E. Brown, Sean M. Lynn-Jones and Steven E. Miller, 1998, *East Asian Security*, London, The MIT Press, pp. xi.

<sup>4</sup> Richard J. Elling and Aaron L. Friedberg with Michael Wills, *Strategic Asia 2002-03: Asian Aftershocks*, The National Bureau of Asian Research, Washington, 2002, pp.5.

defence treaties with Tokyo and Seoul underpin the United States security presence in East Asia. East Asia is increasingly important to the United States economy. United States growth is a major driver for many Asian economies. East Asia is being a more important interest to the United States at same time that it is becoming less stable as an arena of great power interaction.<sup>5</sup>

The history of the United States involvement in Asia has been punctuated by a sequence of memorable dates and dramatic developments; the Japanese attack on Pearl Harbor on December 7, 1941 and the North Korean invasion of the South on June 25, 1950. Each of these events was followed by a major, largely unplanned, expansion in the tangible manifestations of the United States power in Asia and, somewhat more gradually and subtly, by an eventual broadening in the conception of American interests and responsibilities in the region.<sup>6</sup>

The structural trends in Asia that should concern the United States can be summarized in two propositions. First, the East Asia region will become the largest and perhaps the most important concentration of economic power in the next century both as far as the United States is concerned and on its own terms. Second, despite its formidable economic power, the East Asia region will remain a relatively turbulent region beset by internal conflicts and political transitions and subject to persistent insecurity flowing from a changing external environment and military technologies.<sup>7</sup> The proposition that the East Asia region will become the largest and the most important concentration of economic power in the next century is justified by four constituent trends.

First, the region is characterized by some of the highest rates of sustained economic growth in modern history, rates that are likely to remain at relatively high levels for at least another two decades. With the exception of Japan, which as a mature economy, will grow at about 2.5%, the

four “tigers” Hong Kong, Singapore, South Korea and Taiwan are expected to grow at about 6.5%. Second, the wealth and prosperity of the United States will remains dependent on continued linkages with the Asian economies. The East Asia region will also remain the most important arena for the export of American services as well as for direct investments. Third, both China and Japan will become alternative centers of power in economic as well as military terms, with the former emerging as a potential peer competitor to the United States over the secular period. Fourth, the East Asia region is home to a large and increasing concentration of technology capabilities with some emerging center of high-technology excellence.

The East Asia region at large is faced with a interstate conflicts over unresolved territorial and boundary issues as well as competing claims to sovereignty. With the exception of the North-South Korea dispute, which is more a quarrel about who rules over a certain territory than about territory per se, all major and several minor actors are embroiled in territorial or sovereignty disputes. These include the Sino-Japanese disputes over the Senkaku Islands, the Russo-Japanese disputes over the Northern Territories and the Kuriles, the Sino-Russian disputes over the Inner Asian boundary, and the Chinese-Southeast Asian disputes over the Southeast Asian straits. This region also is witnessing an increased militarization in the form of burgeoning conventional capabilities and new weapons of mass destruction together with associated delivery systems. The inevitable long-term trend is that the traditional security regime that maintained order in the East Asia region will be increasing at risk. This outcome is perhaps likely given the growing Asian wealth, military capabilities, and self-confidence conjoined with the relative decline of American power. Both traditional the United States allies, South Korea and Japan, will seek to revise the terms of their security arrangements.

**National Security.** National security is about the protection of a state from external and internal threats. It extends beyond the military defence dimension. A state can no longer focus its defence purely against the military threats. The non-military threats are as devastating if not worst, as far as their consequences to a nation is concern. National

<sup>5</sup> Michael E. Brown, *ibid.* pp. 32.

<sup>6</sup> Richard J. Elling *ibid.* pp. 17.

<sup>7</sup> Zalmay Khalilzad and Ian O. Lesser, *Sources of Conflict in the 21st Century: Regional Futures and U.S. Strategy*, Washington, RAND, 2001, pp. 59-60.

security is complex and thus the solution must take into account all aspects and it will require among other things, patience and time. The well being of the nation depends on how best it can formulate this plan and face the challenges.<sup>8</sup>

Most studies of national security are state-specific and usually executed from the perspective of global powers.<sup>9</sup> Arnold Wolfers defines national security in any objectives sense, measures the absence of threats to acquired values, in a subjective sense, the absence of fear that such values will be attacked.<sup>10</sup>

National security policy overlaps with foreign policy, indeed, sometimes they are almost indistinguishable.<sup>11</sup> National security is the confidence held by great majority of the nation's people that the nation has the military capability and effective policy to prevent its adversaries from effectively using force in preventing the nation's pursuit of its national interest. Giacomo Luciani says national security may be defined as the ability to withstand aggression from abroad and Richard Ullman defines it as a threat to national security is an action or sequence of events that threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or threatens significantly to narrow the range of policy choices available to the government of a state or to private, non-governmental entities within state.<sup>12</sup> According to Barry Buzan (1991), national security is a pursuit of freedom from threats. In international system, security is about the ability of states and societies to maintain their independent identity and their functional integrity.<sup>13</sup>

<sup>8</sup> D.B.Dewill, Common, Comprehensive and Cooperation Security in Asia-Pacific, Canada CANCAPS Paper No 3, 1994, pp. 7.

<sup>9</sup> Muthiah Alagappa, The National Security of Developing States: Lessons from Thailand, Auburn House Publishing Company, Massachusetts, 1987, pp. 1-2.

<sup>10</sup> Barry Buzan, 1991. People, States and Fear, An Agenda for International Security Studies in the Post-Cold War Era, 2nd ed. New York, Harvester Wheatsheaf, pp. 17.

<sup>11</sup> Sam C. Sarkesian, U.S. National Security: Policymakers, Processes and Politics. 2nd ed, Lynne Rienner Publisher, London, 1995, pp. 4-5.

<sup>12</sup> Barry Buzan, ibid. pp. 16.

<sup>13</sup> ibid. pp. 18.

**Security Complex.** A group of states, whose primary security concerns link together sufficiently close that their national security cannot realistically be considered a part from one another. Security complex emphasize the interdependence of rivalry as well as that shared interest.<sup>14</sup>

**ASEAN Regional Forum (ARF).** The end of Cold War had altered the configuration of international relations in East Asia. The new environment presented historic opportunities for the relaxation of tensions in the region through multilateral consultations, confident-building, and eventually the prevention of conflict.<sup>15</sup> ARF was the primary Asia-Pacific multilateral forum for political and security dialogue and now has 25 participating States, including ASEAN, China, India, Russia, the EU, the United States and Canada. The ARF is chaired by the member States chairing ASEAN, and its role remains limited (for example with regard to Korean peninsula issues), it has had success in developing confidence-building measures and promoting multilateralism in the region, notably engaging China. Participating States in the ARF have agreed to evolve the ARF through three stages: promotion of confidence-building measures; development of preventive diplomacy mechanisms and development of conflict resolution mechanisms.

## Disputes In East Asia

**The North Korea Nuclear Issue.** The greatest military threat South Korea is facing is the North Korea's unchanging offensive strategy and posture. The imminent danger is that the North Korea might initiate a war out of desperation. North Korea's nuclear issue, which flared up again in autumn of 2002, was still been unsolved issue until now. North Korea has not fire any of ballistic missiles so far, but is thought to be continuing to develop them. On February 10<sup>th</sup>, 2005, it officially announced that it possessed nuclear weapon.<sup>16</sup> This has a direct and serious impact on the security of East Asia and the international community.

<sup>14</sup> ibid. pp. 190.

<sup>15</sup> <http://www.aseansec.org/14396.htm> (6 Apr 2007).

<sup>16</sup> The Korean Peninsula: Changing Security Environments. *East Asian Strategic Review 2005*. The National Institute for Defense Studies, Japan. Tokyo: The Japan Times. pp. 62-63.

It is believed that the North Korea has possessed 13 types of bacteria. North Korea also deployed the Scud B and Scud C missiles, the Rodong-1 missile, the Daepodong-1, used as a satellite launch vehicle in August 1998. The Daepodong-2 (range 6,000 kilometer) is still under development.<sup>17</sup>

Some of the more recent military action taken by North Korea with the intent to create tension includes the intrusion of the Yeonpyeong Island airspace on February 20<sup>th</sup>, 2003; the test-launch of ground-to-ship guided missile off the East Sea Coast on February 24<sup>th</sup>, 2003; and the threatening interceptive maneuvers on a US RC-135 reconnaissance aircraft on March 2<sup>nd</sup>, 2003. The military capability and posture of North Korea have not changed. North Korea is continuing to intensify self-indoctrination under the "Military First Policy" slogan and is sustaining a vast military apparatus. The further emphasis on WMD development, military build-up, and increased readiness all point to the unchanged nature of North Korea's military threat towards South Korea as well as Korean Peninsula<sup>18</sup>.

The United States have made it clear that they has no intention to attack North Korea, to invade, that multilateral security assurances would be available to them, and to which the United States would be party in the Six-Party Talks. This if they are prepared to give up its nuclear weapons program.<sup>19</sup>

**Taiwan Straits.** The cross-strait balance of power is shifting toward Beijing as a result of China's economic growth, growing diplomatic leverage, and improvements in the PLA's military capabilities, including those that provide Beijing options short of full-scale invasion. It is reported that China's PLA was planning to stage large-scale landing maneuvers in areas surrounding Dongshan Island, Fujian Province. Chinese air, naval, and missile force modernization is increasing demands on Taiwan to develop counter measures that would

enable it to avoid being quickly overwhelmed. In contrast, Taiwan defence spending has steadily declined in real terms over the past decade. The United States government has made clear that it supports negotiation of a peaceful resolution and opposes unilateral changes to the status quo. Yet, Beijing is sustained military building-up in the area of the Taiwan Strait affects the status quo. As far as Taiwan does not announce formally its independence, China will not take the initiative to attack Taiwan.

**Spratly Islands Overlapping Claim.** China could try to forcibly establish and maintain physical control over all or most of the Spratly Islands. Such a Chinese operation could feature the threat or use of force against the territory of an ASEAN states, either to compel acceptance of Chinese demands or to defeat opposing military forces; alternatively, China could expand its "salami tactics" to assert control over more territories. Under either of these circumstances, ASEAN governments could request a more visible and substantial US military presence, including emergency deployments of US naval vessels and combat aircrafts as a demonstration of America's commitment to use force to meet its security commitment. In this dispute, China prefers to deal with security issues and problems on bilateral basis, in which Beijing would retain a significant advantage vis-à-vis any individual ASEAN countries. The 1992 "ASEAN Declaration on the South China Sea" commits the signatories to use peaceful means to settle their disputes and to promote cooperation in joint development without prejudice to territorial claims.<sup>20</sup>

**Other Boundaries Disputes.** There are several other boundaries dispute occurred in this region that can trigger conflicts amongst the countries concern. These include the Sino-Japanese disputes over the Senkaku/Diaoyu Islands chains in the East China Sea, the Russo-Japanese disputes over the Northern Territories and the Kuriles for fisheries right, the Sino-Russian disputes over the Inner Asian boundaries and the Chinese-Southeast Asian disputes over the Southeast Asian straits.<sup>21</sup>

<sup>17</sup> Bruce W. Bennet, The Prospects of Conventional Conflict on the Korean Peninsula, *The Korean Journal of Defence Analysis* 7, No: 1, Summer 1995, pp. 106-113.

<sup>18</sup> National Security Council 2004, ibid, pp 26-28.

<sup>19</sup> <http://hongkong.usconsulate.gov/uscn/2005/05170.htm>. (8 Apr 2007)

<sup>20</sup> Richard Sokolsky, Ayel Rabasa and C.R.Nen, *The Role of Southeast Asia in US Strategy Toward China*, Arington, RAND, 2000, pp. 59-60.

<sup>21</sup> Denny Roy, The Sources and Limits of Sino-Japanese Tension, *Survival*, vol. 47, no. 2, Summer 2005, pp. 191-214.

## The Presence of the United States in East Asia

After the Cold War, the United States made a commitment to maintain around 100,000 troops in the Asia-Pacific region. The sheer number of troops had a psychological effect, symbolizing the firmness of the United States commitment to the region. However, with the current United States defence policy under Bush administration emphasizing "capability" rather than mere "number", this situation is bound to change in a fundamental manner.<sup>22</sup> The availability of military bases is essential for the United States to overcome its vast distance from, and maintain access to East Asia. The importance of the United States-Japan alliance as the linchpin of the United States security strategy in Asia has not changed. In August 2004, President Bush unveiled a plan to realign the United States armed forces with a view to deploying a "more agile and flexible" force in response to contingencies involving terrorists or WMD.<sup>23</sup>

**United States Forces in South Korea (USFK).** The United States forces stationed in the South Korea play a vital role in preserving the military balance on the Korean Peninsula and providing deterrence against large-scale armed conflicts.<sup>24</sup> The Commanding General of the United Nations Command (UNC)/Combined Forces Command (CFC) also commands USFK, Eighth US Army (EUSA), US Navy Forces Korea, US Air Force Korea, US Marine Forces Korea, and the Special Operations Command Korea make up USFK.<sup>25</sup> In case of a contingency on Korean Peninsula, the USFK Commanding General is in full control of the operations of the Seventh US Air Force. The USFK stands at 41,000 men strong, made up of 30,000 in the Army, 8,700 in the Air Force, and 400 in the Navy as well as the Marines.

**United States Forces in Japan (USFJ).** The United States military presence and Japan-the United States security arrangements are critical

<sup>22</sup> East Asian Strategic Review 2005, The National Institute for Defense Studies Japan, Tokyo, The Japan Times, pp. 205-207

<sup>23</sup> ibid. pp. 55.

<sup>24</sup> Defense of Japan 2004, Tokyo, Inter Group Corp., 2004, pp 51.

<sup>25</sup> Peace, Prosperity and National Security: National Security Strategy of the Republic of Korea. National Security Council, May 2004.

to the peace and security of the East Asia region. While maintaining deterrence by the United States forces, Japan want the United States to consider reducing the burden imposed on the people of localities hosting the United States bases. In response, the United States would make efforts to reduce the burden on the local people by achieving efficient deterrence. Japan will proactively engage in strategic dialogue with the United States on wide-ranging issues such as role sharing between the two countries and the United States military posture, including the structure of the United States forces in Japan. On the realignment of the USFJ, Japan and the United States have yet to reach a concrete agreement. USPACOM Commander said that the United States had been working closely with Japan to reduce the overall number of the United States troops in Japan, to lessen the burden on the local communities and to adjust the force posture in Okinawa.<sup>26</sup>

## The Impact on National Security In East Asia Region

The East Asia countries have varied views on national security and threat assessments, with some countries perceiving domestic anti-government forces rather than neighboring countries as an issue of security. In the region, there have been changes in diplomatic relations since the 1990s. For example, many bilateral relations between two opposing countries have either been normalized or significantly improved. The economy has a great impact on regional security. In recent years, efforts have been made to enhance cooperation, particularly in the economic field that includes Free Trade Agreement (FTA).

**China.** China's national objectives are to achieve internal security and modernization, maintain territorial integrity and achieve peace and stability in the region. Its national strategy is to avoid war while using diplomacy, trade and economic incentives and propaganda to advance its objectives. Nevertheless, military power is being improved so that it too can be used as an instrument of policy if other means fail. One of the most

<sup>26</sup> East Asian Strategic Review 2005, The National Institute for Defense Studies Japan, Tokyo, The Japan Times, pp. 205-207.

important factors boosting the mood to strengthen East Asia cooperation in recent years has been a shift of emphasis in China's foreign policy on improving regional economic, diplomatic, normative and security relations. It has increasing their regional power and influence. China is growing in strength economically and militarily. China advances in the South China Sea, the modernization of its naval and air forces, and the development of its nuclear forces have causes other to perceives China as a threat. The naval forces engage in uncontested expansion in the South China Sea, may threaten the access to resources and the flow of oil from Persian Gulf to East Asia. China had not exactly been keen on multilateral cooperation; it had long considered that multilateral cooperation generates less influence overseas than does bilateral cooperation. China has been involved in multilateral cooperation since mid-1980s, where China has begun to become active in multilateral talks on security issues through various forums such as the ASEAN Regional Forum (ARF) and the 'Shanghai Five' initiative (security cooperation with Russia and three Central Asian countries).<sup>27</sup>

Chinese purchases of Russian military hardware, including missiles, naval vessel and fighter aircraft, Chinese ongoing military improvement seem to pose a serious problem to the United States strategy in this region. China is preparing to deployed solid-fuel ballistic missiles that can target United States allies in East Asia and nearly completion of an intercontinental ballistic missiles that can target the continental United States. It is also making advances in development of its next-generation submarine-launched ballistic missiles.<sup>28</sup>

**Japan.** Japan is unquestionably an economic power, much less militaristic than what it used to be. Japan wish Asia to be as peaceful and stable as possible mainly perhaps from the commercial point of view and trade considerations as it has substantial financial investments in Asia. This, in fact, is a unique security environment that should

encourage stability. Under this peculiar geopolitical structure the confrontation between the major powers in Asia does not really exist now. One however cannot say with total conviction that there are no flash points in Asia and which can have destabilizing forebodings.

The North Korean IRMB (Intermediate Range Ballistic Missile) which can easily reach out to Japan and which launched on August 31, 1998, indicates the highly unpredictable posture of North Korea. It clearly shows that North Korea posses weapons of mass destruction (WMD) which is destabilizing. This is a cause of great apprehension and has created even compelling problems for United States that is a staunch ally of Japan in its defence needs and enjoys security collaboration. The best Japan could do to in response to the North Korea missile launch was to postpone food assistance programme to North Korea and the assistance package under Korean Peninsula Energy Development Organization (KEDO).

Japan and the United States are cooperating in the development of missile defence, which is the primary issue that will help shape the alliances. Japan also has sent elements of its Self-Defence Force to Iraq in support of the United States mission there (in non-combat roles). Japan's constitution, drafted by the United States at the end of WWII, prohibits the country from going to war. But there is strong pressure to revive the constitution so that Japan's Self Defence Forces can act as a real military.<sup>29</sup>

**South Korea.** South Korea's defence planning has centered on how to deter and defend the South against the North's formidable military threat. Despite the end of Cold War, defence planning still remains threat-driven, it entered into an alliance with the United States as security guarantor. With the guarantor, Seoul has accomplished remarkable force modernization and ultimately has set a goal to be able to defend itself without United States help in future.<sup>30</sup> These actions, however have not

<sup>27</sup> Japan's Leading Role in East Asian Regionalism-Toward Building an East Asia Community, *East Asian Strategic Review 2005*, Tokyo, The Japan Times, 2005, pp. 44.

<sup>28</sup> Robert S. Ross, Assessing The China Threat, *The National Interest*, Fall 2005, pp. 81-87.

<sup>29</sup> [http://www.washingtonpost.com/ac2/up-dyn/A32297\(on line\) 8 Apr 07.](http://www.washingtonpost.com/ac2/up-dyn/A32297(on line) 8 Apr 07.)

<sup>30</sup> Chung Min Lee, Crisis and Conflicts Short of War, The Case of the Korean Peninsula, *The Korean Journal of Defence Analysis* 7, No. 1, Summer 1999, pp. 31-33.

curtailed North's desire to win the arms competition. On the Korean Peninsula, disputes over North Korea's nuclear issue continued into 2004. The Six-party Talks aimed at settling the issue hit a snag in the second half of the year, leaving the matter unresolved.<sup>31</sup>

South Korea's defence objectives are to defend the nation from external military threats and aggression, to support a peaceful unification and to contribute to regional stability and world peace. Defence objectives address the need to prepare for future threats to preserve Korea's security and stability in the post unification era. The possibility of a North Korean surprise attack is the most obvious threat to South Korea's security. Seoul has relied on the bilateral alliance with the United States to deter North Korea's military threats. Nuclear and conventional deterrence via the bilateral alliance is the core of South Korea's deterrence strategy. South Korea's conventional deterrence has also relied upon the combined ROK-US deterrence strategy. Although South Korea's exceedingly stronger economic and technological capabilities could have enabled the South Korea to easily win the arms race with the North, the South did not attempt it. Instead, the South has a self-imposed restraint on military manpower and has willingly adopted a defensive strategy requiring smaller numbers of manpower and weapons than the North.<sup>32</sup>

**North Korea.** North Korea has been advocating as its basic national policy the construction of a strong and rising great power, aiming to create a strong socialist states in all areas, intellectual, political, military, and economic and its adopts a "military first policy" to realize this goal. The policy has been defined as a form of leadership that advances the great undertaking of socialism by resolving all problems that arise from reform and construction on the principle of military first and stressing the importance of the armed forces as the pillar of reform.<sup>33</sup> North Korea has gone ahead with the survival strategy of it nation and pressed ahead to normalize and improve relations

<sup>31</sup> The Korean Peninsula-Changing Security Environments, *East Asian Strategic Review 2005*, Tokyo, The National Institute for Defence Studies, 2005, pp. 61.

<sup>32</sup> National Security Council 2004, ibid. pp 26-28.

<sup>33</sup> Defense of Japan, 2004, ibid. pp. 41.

with Western Europe and established diplomatic relations with Sweden, Norway, Austria, Denmark and the EU countries. This approach toward EU was to overcome its diplomatic isolation and to become a member of the international community. China remains a close friend and provides food and fuel, because it does not want the country to collapse and create instability in the region. Although facing serious economic difficulties, it has taken great deal to maintain military superiority over South Korea. It is to ensure their way to survive and maintaining its existing military policy and to strengthen the military-centered governing system. North Korea's nuclear and missile capabilities still posed as potential threats within the region. The leader still consolidates his power to continue his vision of unifying the Korean Peninsula. Majority of the North Korean forces are forward deployed and located within 40 miles of De-militarized Zone (DMZ). It has developed a significant advantage in the fields of theater ballistic missiles, special operation forces, and heavy artillery. It would appear that North Korea develops, deploys, and proliferates weapons of mass destruction and ballistic missiles, while maintains large-scale special operation forces, thus maintaining and enhancing its asymmetrical capabilities.<sup>34</sup>

**Taiwan.** The Taiwanese government intends to amend the constitution between 2006 and 2008. This will cause strong opposition from mainland government. The manifestation will be the increasing military deterrence from China. Pro-independence political force in Taiwan estimates China does not have the military strength to confront the United States. Therefore, China dares not to use military force to curb Taiwan independence. This might be dangerous testing the bottom line of China and the United States on this issue. The United States still insisted on the principle of "oppose any efforts by either side to unilaterally alter the status quo." The United States will apply strong diplomatic, economic or military action to stop it and maintain the strategic stability in this region. As far as the United States government insists on the current Taiwan policy, Taiwan Straits will remain peaceful. In April 2001, President Bush approved a substantial

<sup>34</sup> Defence of Japan, 2004, ibid. pp. 42.

sale of weapons to Taiwan including Kidd-class destroyers, anti-submarine P-3, "Orion" aircraft and diesel submarine to help Taiwan's defence. The effort of the government to reject the one-China formula failed in 2004 legislative election and public concern of the risk of confrontation with Beijing.<sup>35</sup>

## Conclusion

In the post Cold War, the events in East Asia are subjected to the action taken by the United States which has an impact in the future of East Asia. The United States grand strategy will determine the peace and stability of this region. The studies of East Asia are related to the planning and execution of the national security of all countries of East Asia. All disputes in this region can be settled with the ARF approaches or other regional security cooperation such as SCO that will get every member to talk and settle the disputes. The East Asia countries should establish their own regional security component or security complex to resolve their problem without getting involved with other parties to avoid bias or disparities in their negotiation process. The Six-Party Talks should be turn into East Asia regional security cooperation or complex and use it as a platform or mechanism for the stability and peace of this region. The United States will be the important element in this forum.

The presence of the United States forces and its alliances with Japan and Korea is critical to balance the emerging power of China in East Asia region. It's a major means by which international power has been balanced and orders are maintained. It has sought to maximize stability by aggregating deterrent power and so preventing the development

of imbalances that might increase the risk of war. Without United States forces, China will have the freedom to create instability toward their neighbor especially toward Taiwan, South Korea and Japan. The nuclear weapon threat from North Korea and Taiwan Straits issues will also trigger conflicts in the region without United States presence. The Bush administration plans to redeploy their forces in this region have to consider the threat from China although both countries have shown a reluctant toward the existence of United States forces on the soil. The vacuum left by the United States will creates arms competition amongst East Asia countries especially China and Japan.

The East Asia region is very important toward the United States due to their security, trade and politic interests. The disputes amongst the countries in this region can be stabilize by the presence of the United States forces and they should have their own regional security to solve problems exist. The conflicts in this region can be avoided due to their bilateral and multilateral trade among the countries that recorded all time high especially between Japan and China, in 5 consecutive years from 1999, reaching approximately USD132 billion in 2003, up 30% from 2002.

The success of the Six-Party Talk that includes North Korea will guarantee the stability and peace of East Asia region. The commitment of China and Russia is very important beside the United States to ensure North Korea engagement into settling the nuclear problems in the talk. Any disputes in the region will effects the flow of oil from Middle East and Russia that is very important resources to the growth of their economies and stabilities.

<sup>35</sup> Kerry B. Dumbaugh, Taiwan: Recent Developments and U.S. Policy Choices, Congress Research Service Issue Brief for Congress, 10 Jan 2005 Washington.

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# ANALYSIS FROM THE AFGHANISTAN WAR ON ASYMMETRIC WARFARE: PROSPECTUS AND RECOMMENDATIONS FOR THE MALAYSIAN ARMY

By Mej Saiful Nizam bin Che Soh

"Untuk menjamin kedamaian dan kestabilan negara daripada dicerobohi dan diancam dengan ancaman bukan tradisi dan **asimetri**, ATM mengaturgerakkan perajurit-perajurit kita di semua pelusuk sempadan, darat dan maritim, di pulau-pulau dan juga di kawasan dan aset utama yang strategik".

Laksamana (B) Tan Sri Dato' Sri Mohd Anwar bin Hj Mohd Nor,  
Chief of Armed Forces – 16 Sept 2006

## INTRODUCTION

The information revolution and related organizational innovations are altering the nature of conflicts and the kind of military structures, doctrines and strategy that will be needed. Asymmetric Warfare is a concept for thinking for this era as industrialization led to "attrition warfare by massive armies" was for World War I and "tank manoeuvre" predominated for World War II. At a minimum, Asymmetric implies that, the techniques will grow more and will develop as adjuncts to overall military strategy. In this sense, it resembles the existing notions of "Information Warfare" and "Asymmetric Warfare" that emphasize Terrorism, Low Intensity Conflict, Limited Warfare etc. However, the information revolution may imply overarching effects that necessarily substantial for modifications in military organization and force posture. It refers to conflicts at tactical and military levels and applies to the social struggles most often associated with the Low Intensity Conflict, Terrorism, Limited Warfare etc by non-actors and in some cases state sponsored events such as terrorists, drug cartel or black market proliferation of weapons of mass destruction. All these concepts imply that future conflicts will be fought by unconventional and unprecedented ways of warfare that one can imagine and that who ever masters these aspects of warfare jugglery, will gain major advantage.

Although technological revolutions have given a lot of strength to the modern armies, yet the conventional warfare will still be resorted to in an unconventional way. The recent past is full of examples of such like conflicts; Vietnam War, the conflicts in Somalia, Russian-Chechen skirmishes, Russian-Afghanistan conflict, Palestinian Liberation Movement and so and so forth, the history is crammed with many other examples as a prove that even the world premier armies with all the modern technologies and equipment, still find its vaunted military superiority to be of little use in the face of sophisticated unconventional threats like "Asymmetric Warfare". Being a variant of Conventional Warfare and fought between adversaries with unmatched differences in physical and morale strength over one another.

## AIM

To explain the concept of Asymmetric Warfare with the analysis from Afghanistan War experience.

## SCOPE

The scope of this paper will cover the following:

- a. Concept of Asymmetric Warfare.
- b. Analysis from the Afghanistan War.
- c. Military Response Options.
- d. Recommendations for Training in The Army to Fight Asymmetric War.
- e. Conclusion.

## CONCEPT OF ASYMMETRIC WARFARE

**General.** Asymmetric warfare is a warfare in which two sides in a conflict have such drastically different strengths and weaknesses that they resort to dissimilar tactics, strategy, techniques, methods or even weapon systems to exploit the weaknesses or vulnerabilities of the other to achieve the relative advantage.

**Definition.** Asymmetric Warfare can be defined as the warfare in which drastically difference exists in between the two opponents. Asymmetric Warfare may also be defined as the use of unconventional tactics to counter the overwhelming conventional military superiority of an adversary. The terms "asymmetry", "asymmetric warfare", "asymmetric approaches" and "asymmetric options" are popular sound bites found in many military journals today. Liddell Hart explained, "Campaigns of this kind are more likely to continue because it is the only kind of war that fits the conditions of the modern age, while being at the same time suited to take advantage of social discontent, racial ferment, and nationalist fervours."

**Concept.** Asymmetric Warfare is not only the domain of weaker or numerically/technologically inferior opponents. Strategy has been employ even by the superpowers in the past to alter the changing course of wars. Asymmetric approaches often employ innovative, non-traditional tactics, weapons or technologies and can be applied at all levels of warfare. The concept has mostly been refined by United States strategists. The US has an overwhelming technological superiority over her opponent. Depending on ones definition,

Asymmetric Warfare may include conventional terrorism, classic Guerrilla Warfare and the use of cyber attacks and information warfare. It can also include the use of surprise in all its operation and strategic dimensions.

### Dimensions of Asymmetry.

- a. **Positive Asymmetry.** Positive asymmetry uses difference to gain an advantage.
- b. **Negative Asymmetry.** Negative asymmetry involves an opponent's threat to one's vulnerabilities.
- c. **Short Term Asymmetry.** Military history shows that sooner or later the enemy adjusts too many types of short-term strategic asymmetry.
- d. **Long Term Asymmetry.** Long term asymmetry is rarer. However, sustaining an asymmetric advantage requires constant effort; any military force that does not adapt to strategic change will decline in effectiveness.
- e. **Deliberate Asymmetry.** It is the deliberate application of asymmetrical strategic to exploit opponent's vulnerabilities.
- f. **Asymmetry by Default.** At times an asymmetric outcome is more accidental than planned.
- g. **Low/High Risk Asymmetry.** Strategic asymmetry can be low-risk or high-risk. Some forms of asymmetry such as superior training or leadership are time-tested.
- h. **Discrete/Integrated Asymmetry.** Strategic asymmetry can be discrete or integrated with symmetric techniques.
- i. **Material/Psychological.** Asymmetry can be material or psychological. The two concepts are interrelated; a material asymmetric advantage often generates psychological advantages.

## Forms of Asymmetry.

- a. **Asymmetry in Technology.** Asymmetric technology gives an industrially advantage state against opponent.
- b. **Asymmetry of Will.** Asymmetry of will is most relevant at the level of ground and strategy.
- c. **Asymmetry of Organization.** The asymmetry in organization will certainly play an important role in any future conflict.
- d. **Asymmetry of Patience.** This is linked with asymmetry of will.
- e. **Asymmetry in Strategy and Tactics.** It comprises asymmetric strategies and operations, which range from low-technology to high-technology.
- f. **Asymmetry in Aims and Objectives.** The belligerents may have different and varied military and strategic aims as well as objectives.
- g. **Asymmetry in Nuclear Weapons.** Nuclear weapons are perhaps the asymmetric weapon of choice. The threatened use of Weapon of Mass Destruction can produce strategic and political effects that may overshadow their military utility.
- h. **Asymmetry in Use of Biological and Chemical Weapons.** Chemical weapons will proliferate and will be widely used because they are the easiest to develop and they are inexpensive.
- i. **Asymmetry in Economic Warfare.** More enlightened terrorists have discovered, or will discover soon, that the path to the fear and chaos that they crave most may be more easily achieved by a wide-scale attack on infrastructure/economic targets, thus causing a general breakdown in society and facilitating civil unrest and rioting.

## Levels of Asymmetry.

- a. **Operation Level.** The most common form of asymmetry resides at the operation level of war. History examples include the German use of submarine warfare to counter balance the British advances in capital ships, long range fires in the battles for Stalin guard; and operation Body guard.
- b. **Military-Strategic Asymmetry.** Military Strategic Asymmetry is an interrelated military strategic based on asymmetry.
- c. **Politico-Strategic Asymmetry.** Politico-strategic Asymmetry is using non military means to gain military advantages.

**Vulnerabilities and Asymmetries.** Many strategists consider asymmetry to be the ability to exploit situation by attacking weak points or using non traditional approaches in unexpected way. The vulnerabilities can be uncovered by using a specific methodology to examine a situation. This method uses of the following five means:

- a. Performance parameters.
- b. Situation context.
- c. Operation principles.
- d. Rules of engagement.
- e. Will.

## Tools of Asymmetric Warfare.

- a. Guerrilla Warfare.
- b. Cyber Warfare.
- c. Low Intensity Warfare.
- d. Terrorism.
- e. Psychological Warfare.

- f. Information Warfare.
- g. Suicide Bombing.
- h. War of Economy.
- i. Revolution in Military Affairs (RMA).
- j. Employment of Latest Generation Weapons/Technology.
- k. Information Warfare.
- l. Use of Low Intensity Conflict.
- m. Use of Weapon of Mass Destruction.

## **ANALYSIS FROM THE AFGHANISTAN WAR**

**Background.** In the wake of catastrophic events of 11 Sep 2001, a joint diplomatic effort of United States and United Kingdom quickly resulted into an international coalition against terrorism and United Nations Security Council empowered the use of force against Afghanistan. The initial code name of the operation was "The Infinite Justice" later named as operation "Enduring Freedom". This operation not only transformed the strategic landscape of Afghanistan but also profoundly influenced Central Asia, South Asia and Middle East.

**Operation Enduring Freedom** - Concept of Operation. The conduct of air operations was aimed at destruction of the Al-Qaeda terrorist organization, infrastructure and other terrorist groups. United States and British military operation against Afghanistan commenced on 7 Oct 2001. Support Operation Forces was introduced. It involved the deployment of carrier battle groups, a considerable number of aircrafts, and Support Operation Forces. The strategic, operation and tactical dimensions of United States led military campaign in Afghanistan were:

- a. **Strategic Level.** At the strategic level, the military campaign was the war against terrorism others dimensions being diplomatic, financial, law enforcement and humanitarian.

b. **Operational Level.** At operational level, aim was the destruction of Al-Qaeda and destroying the Taliban military potential.

c. **Tactical Level.** At tactical level five lines of operation one can identify to include control of air, direct attacks on the leadership of Al-Qaeda and the Taliban, destroying the Taliban military forces, information operations and humanitarian relief.

**United States Air to Surface Weapons.** A large variety of high technology munitions include cruise missiles, Precession Guided Munitions (PGMs) and unguided bombs were used in air campaign under poor target environment in Afghanistan.

**Analysis of the Campaign.** The analysis of the campaign reveals follows:

a. **Formulation of International Coalition.** Hectic diplomatic efforts, well orchestrated media campaign and exploitation of "only super power" status enabled United States to not only win international support for launching war against terrorism but was also able to quickly formulate coalition forces.

b. **Synergy of Effort.** Combining the resources of international agencies produced results which no single agency could have produced.

c. **Importance of Close Support Operations.** Air effort flown in support of Northern Alliance troops resulted in early eviction of Taliban Forces from their positions.

d. **Versatility of United States Air Force.** The degree of flexibility possessed by United States Air Force allowed air operations to shift from one objective to another quickly and decisively.

e. **Effects of Precession Guided Munitions (PGMs).** Out of the total tonnage of aerial ammo dropped, 58% were the PGMs. The use of PGMs resulted into reduced no of sorties and achievement of quick results in the campaign.

- f. **Importance of Command, Control, Communication, Computer and Intelligence (C<sup>4</sup>I).** The operation proved the increase reliance on C<sup>4</sup>I system.
- g. **Importance of Joint Operations.** The coordination of well trained air and ground teams has permitted effective use of aerial platforms.
- h. **Role of Remotely Piloted Vehicles (RPVs).** The RPVs have proven their worth in the skies over Afghanistan. Surveillance, intelligence gathering and destruction of pin point targets were successfully accomplished by the RPVs like Predator.
- i. **Intelligence.** Continuous and unimpeded flow of intelligence remains key to the success. Human intelligence is essential which require people on ground. This also played important role in the downfall of Taliban.
- j. **Psychological Operations and Electronic Warfare (EW).** It was successfully conducted by Coalition forces. This denied local support to Taliban/AI-Qaeda forces thereby enabling coalition forces to target the enemy with ease.

#### **Asymmetries Exploited by Taliban.**

- a. Superior religious motivation.
- b. Terrain favouring conduct of unconventional warfare.
- c. Homogeneity of Taliban, who were predominantly Pushtuns, mainly restricted to Pushtuns populated regions.
- d. Anti United States/West media war.

#### **Asymmetries Exploited by United States.**

- a. Total lack of air support.
- b. Exploitation of ‘precision warfare’.

- c. Combine employment of Special Forces and air, especially to enhance the PGMs effects.
- d. Taliban’s geo-political isolation in the region.
- e. Use of Northern Alliance forces on ground.
- f. Non-regular nature of Taliban forces.
- g. Superior United States forces.
- h. Media/psychological warfare.

#### **MILITARY RESPONSE OPTIONS**

**Defensive Strategies.** It envisages denial of support ace while conducting battle of attrition and denying enemy victory by limiting his ability to generate his combat power. It implies being strategically on the defensive and envisages a force configuration based on very strong operation reserves and limited strategic reserves with a capability of completing the defensive cycle.

**Pre-emption.** Capitalizing on time advantage differential of completion of assemblies, launch an offensive in a selected zone to eliminate or impair enemy offensive option.

**Defensive and Offensive Strategy.** It entails being strategically on the defensive while tactically on the offensive. It allows absorption of enemy’s main thrust/effort and capitalizes on the relative vacuum in the rear to undertake one or two counter strokes in the form of riposte/counter offensive. It is based on a force configuration based on strong strategic reserves.

#### **RECOMMENDATIONS FOR TRAINING IN THE ARMY TO FIGHT ASYMMETRIC WAR**

**Asymmetric Warfare Training.** The study of asymmetric warfare and its conduct must be included in curriculum of all training centre and also be include and imparted during exercises. Army Training Headquarters should come up with a

proper doctrine or pamphlets on asymmetric warfare to embark the knowledge of our officers and soldier in facing this type of battle.

**Leadership Training.** The army must train its leader's, especially junior leaders who will be the cornerstone of success under asymmetric environments (unity of command).

**Rapid Movement and Deployment Training.** Mostly weaker armies are very slow and cumbersome while moving and deploying. Steps must be taken to impart training for rapid movement and quick deployment under all conditions.

**Operations over Wide Frontages.** Forces may be deployed over large frontages to avoid detection and destruction by enemy air and missiles strikes. Frontages will thus be stretched to the maximum. Troops therefore, must be trained to fight over wide frontages.

**Training under Adverse Air Environments.** While fighting a technology or numerically superior enemy, operations will always be conducted under adverse air situation. Troops must be trained to fight under such conditions when heavy punishment from the skies would make movement and operations very difficult.

**Situation Training.** To improve the reflexes, imparting of situation training is of paramount importance. As soldiers are at the execution end so they need to have better reflexes than enemy which can be improved by regular situation training at unit level.

**Knowledge about Enemy.** Sufficient knowledge about enemy's tactics and equipment is ensured down to NCOs level, which will enable them to work for ways and means to defeat enemy tactics and equipment.

**Expertise in Handling Weapons and Equipment.** All persons must be expert in their own fields and handling of their personnel weapons and equipment. The army must make the best use of the available resources at hand, while at the same time try to procure better ones in countering a sophisticated weapon system in the future war.

**Fighting when Isolated.** Isolation of units and sub-units will be a common feature in case of war with a numerically or a technologically superior enemy. Troops must be trained to fight under such conditions by organizing all round defence on suitable terrain when isolated.

**Urban Warfare Training.** Preparations and occupation of fortresses and strong points, and fighting in built up areas must be paid special attention during this type of training.

**Camouflage, Concealment and Deception.** Proper camouflage, concealment and deception techniques will save precious lives and equipment/resources during the enemy's air/missile attacks.

**Nuclear, Biological and Chemical Warfare Training.** Such training when imparted extensively to the troops would not only help them survive and operate under such environments but would also convey a message to the enemy that the nation is preparing to conduct such war when forced, hence making him think twice before deciding to launch military operations.

**Civil Defence Training.** Army must organized civil defence training to prepare the citizens and the civil infrastructure for war. Recent conflicts in Yugoslavia, Kosovo and Iraq have displayed that the difference between civilians and combatants does not exist when the battle for control of the cities starts.

## CONCLUSION

In the prevailing situation the chances of an all out war between any two nations is remote. However, the chances of Low Intensity Conflicts which are asymmetric in nature cannot be ruled out and which may escalate into a limited war depending on threat response. Due to the internal instability, internal threat to security to a country remaining abreast with the latest situation and an immediate response to exploit any opportunity provided in the due course is prerequisite. To effectively deal with acts of asymmetry, good intelligence, early warning and timely identification of threat and a reciprocal response is compulsory.

A weak and poor nation is in no ones interest on the other hand a strong country is the only guarantee of peace and stability in any region. For us the use of technology as a force and economic multiplier will definitely enhance the socio-economic defence and security of a territorial in the region. To be successful, we need to develop a broad strategy and a political consensus robust enough to encompass and cope with the geopolitical uncertainty around us. We need to be clear about

our goals, for our friends as much as for our enemies. Our real strength will come from economic and social harmony at home and a strong self-sustained defence infrastructure to deter attack from abroad. Malaysian Army should focus this type of battle by considering the basis and concept of asymmetric environments especially on the training to gain our military personnel knowledge when facing the real unconventional warfare in the future.

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# DEVELOPING NETWORK CENTRIC WARFARE



By Brig Jen (B) Dato' Mohd Zaki Wan Mahmood

## Synopsis

The revolution of military affairs has brought changes, in the form Network Centric Warfare (NCW), to command and control (C2) systems of military forces. Many military forces have initiated their migration from the earlier version of C2 to the NCW. Steps taken by these militaries are logical progression from current C2 systems to NCW by integrating existing networks of information, surveillance and weapons. They aim at achieving efficient combat force deployment through improved information sharing and decision making. Pilot projects are introduced for new requirements, which will be included in the NCW once they are proven to be suitable. Developments of NCW are done through current C2 system maintenance and by local companies to ensure project success and system security. NCW systems are developed to meet military's specific operational needs. No one NCW system fits all requirements.

## INTRODUCTION

Military commanders perform their primary roles of command and control effectively mainly owing to thoroughness of command and leadership training undergone by military personnel. However, all functions of command and control must be supported by efficient information and communication systems. With reliable information then only these functions can be effective. Efficient command and control will ensure military achieve desired objectives swiftly and effectively. Systems that provide reliable information are vital to commanders.

Command and control functions rely on information systems that give accurate, updated, relevant and immediate information. Information is required by staff to formulate advice to commanders, and information is required by commanders to make decision. Relevancy, timely and accuracy are factors guiding in developing information systems. These systems are regularly improved, enhanced and upgraded, to strive for information and function efficiency.

System improvement is unavoidable, because of being outdated, increasing sophistication of combat resources, availability of new technology, preference of commanders and changes in organisation, strategic or operational environment. Ever changing operational environment is one that commanders have to cope with in modern battlefields, especially changes that are caused by adversaries' who have electronic warfare (EW) and information warfare (IW) capabilities. EW and IW threats are never static. Given time adversaries will develop measures to hinder efficiency of your command and control systems, as well as other defence electronic devices.

In the new millennium the military has introduced a new command and control concept, the network centric warfare (NCW), a logical progression from systems of C3, C4I and C4ISR. Most military forces have implemented the C4I or the C4ISR systems, at joint and single service level. With existing systems, experienced staff and top-down driven needs, they are in best positions to implement the NCW concept. The present systems mostly are being maintained by local companies, which can support in the NCW

venture. The local companies are capable, prepared and willing to contribute towards NCW development for their national defence forces.

The aim of this paper is to suggest some ways forwards for the military towards achieving their wishes to introduce the concept of NCW. The paper will discuss concept and characteristics of NCW and some possible steps of development.

## UNDERSTANDING NCW

**Changes.** The NCW concept is part of the revolution in military affairs. The factors that caused these changes are positive economic growth, availability of technology, application of technology by the commercial world, changes in military business processes and organizational. Some are as demanded by commanders or communication planners wanting to provide the best system utilizing the best technology. In the case of the NCW, *it is really about exploiting information to maximize combat power, by bringing more of our available information and war fighting assets to bear both effectively and efficiently.*<sup>1</sup> However, the ultimate objective is to satisfy commanders in the performance of their command and control functions. Requirement for changes, enhancement and upgrading in military systems are common. In the case of command and control systems and facilities, changes and enhancements have always been taken place.

**Historical Development.** Military command and control systems could have started after the invention of telegraph in 1843 and telephones in 1876. Then radios were brought in after the invention of wireless in 1895. In the 60s radio-wire integration was introduced. In 70s and 80s the grid area network system was used, utilizing multi-channel line-of-sight radios, allowing integration of terminal equipment to combat radios. From here emerged the command, control and communication (C3) systems in the 80s. Later “intelligence” and “computer” were added to become C4I. Towards the end of the last century “surveillance” and “reconnaissance” (SR) facilities were integrated

into the systems creating C4ISR systems. These developments are aimed at efficient information sharing and situational awareness distribution.

**Purpose of NCW.** The purpose of NCW is to provide facilities for sharing of quality and timely information and situational awareness. NCW is to provide efficient command and control for mission effectiveness. The facilities in NCW are information storage and information transmission, in networks connecting C4I system to sensors and weapons systems, to facilitate decision-making, effective planning and efficient operations. NCW systems will have to meet the following criteria to achieve a dramatic increase in mission effectiveness:

- a. A robustly network force to improve information sharing.
- b. Enhances information quality and shared situational awareness.
- c. Enables collaboration and self-synchronisation, and enhances sustainability and speed of command, and,
- d. These in turn, dramatically increases mission effectiveness.<sup>2</sup>

**NCW Components.** The NCW concept is derived from three words that may convey the method of command and control envisaged to be that of the future. The three words indicate that command and control functions are performed through networks of information. Through these networks intelligence is received, appreciation and operational plans are done and orders are executed. The NCW system will have the following components to facilitate these functions:

- a. **Networks.** Each NCW system will consist of wide area networks (WAN) to cover assigned operational area. Each headquarters will have its own local area network (LAN).
- b. **Sub-systems.** The NCW networks will have sub-systems that handle the functions of command and control, intelligence, surveillance, reconnaissance and weapon.

<sup>1</sup> DS Alberts, JJ Garstka and FP Stein, *Network Centric Warfare*, CCR Publication Series, p 12.

<sup>2</sup> From Wikipedia, the free encyclopaedia, on the Internet

c. **Communications.** The NCW will be supported by networks of multi communication means to provide resiliency.

d. **Software.** The networks will have software application capabilities suitable to support the military to perform various offensive and defensive operations.

e. **Protection.** Network protection will include EW and IW defences.

**Benefits.** The NCW concept is expected to have advantages over the existing systems. It is going to be superior in information and information has the dimension of relevancy, accuracy and timeliness.<sup>3</sup> Possible benefits from the new concept will be as follows:

a. **Battle-Space Entity.** Self-contained networks with adequate information and have capabilities to support efficiently functions of command and control of combat forces.

b. **Improved Access.** It allows information within the network to be accessible to all at all levels. Intelligence and information on resources and their deployments are current.

c. **Synergy for Massing of Effects.** It is aimed at achieving maximum effect from available forces. Information will be a major force multiplier factor to combat forces.

d. **Effective Combat Power.** The NCW will help to achieve the principle of war of “economy of effort”, yet able to acquire effective combat power. The networks will allow for efficient planning and commanders are able to apply decisive force onto the enemy.

e. **Knowledge Capable Force.** The concept is successful only when the troops are technically competence to maintain and use the systems effectively.

f. **Human and Organizational Dimension.** The concept has human and organisational

dimension, that it requires changes in manpower training and organisational structure.

g. **Network Centric Thinking to Military Operations.** Civilian concept of network centric is being applied to military business process. All information is made accessible and available to commanders and staff officers at all times and at all levels.

**Characteristics of NCW.** The NCW will have the best characteristics for a command and control system. Some of the major characteristics the NCW systems must have are as follows:

a. **Reliability.** The system must be reliable and adequate to support the intended military operations. The system is supported by an efficient maintenance services, sufficient back-ups of equipment and effective restoration plan for any system failure.

b. **Speed.** The network has sufficient bandwidth to cater for multimedia transmission. Information can be transferred in customised format or unformatted. Deployment of the system into battlefield and recovery must be easy and can be done in short time.

c. **Survivability.** The NCW system is able to survive any attempt to disrupt its services. It is protected from intrusion and have efficient data recovery plan. Connectivity and communications have redundancy. Distributed data base concept will avoid from a total loss of information. System owner does its own management and control of access right.

d. **Flexibility.** The system must have the flexibility to be deployed to any theatre and adapt to any operational environment and threat. It must have sufficient reserve to cater for any eventuality and have communications of multi-means and multi-modes.

e. **Simplicity.** The system network is simple that it can be easily established. It is readily acceptable to all levels of command for it follows the chain of command. Human machine interface is simple that it is popularly and effectively used by commanders and staff.

<sup>3</sup> DS Alberts, JJ Garstka and FP Stein, *Network Centric Warfare*, CCR Publication Series, p 54.

f. **Economy.** The system must be economical to develop and establish, maximising utilisation of all existing networks and equipment and commercially-off-the-shelf products. Maintenance, enhancement and operating such a system will be economical too.

g. **Security.** The NCW systems must have all the protection against EW and IW attacks. IW attacks may be originated from external and internal.

h. **Upgradeable.** System design must be such that it can be readily upgradeable, by components, equipment, sub-systems or each entire system.

## NCW SYSTEM CONCEPT

**Function.** The function of a NCW system is to support commanders in the performance of their command and control responsibilities. The system must have the essential capabilities so that it is able to support with relevant, accurate and timely information. Its concept is envisaged to have ultimately facilities, activities and objectives as highlighted below to enable it to function effectively as a command and control system.

**Facilities.** NCW systems will have facilities crucial to the command and control functions of commanders in battle fields. The systems must have the following facilities:

a. **Information.** The system has facilities to store and transmit information that is required by commanders and staff in combat. Data bases with latest information will be part of the system. Commanders and staff will have access rights to view the information.

b. **Decision Makers.** Tools for decision making, such as tables, charts, graphs, maps, analysis aid and simulation will be part of the system.

c. **Sensors.** All sensors assigned to a command will be in one network and the sensor network is integrated to the NCW to provide real-time combat battle picture.

d. **Weapons.** Combat forces, platforms and weapon systems are connected to the NCW system. Their commanders are able to receive orders, verify them and have access to relevant battlefield information and intelligence.

**Activities.** The NCW system is expected to perform some essential functions to create information to support commanders. Activities within the NCW are as described below.

a. **Intelligence Functions.** One main activity is the intelligence function. Processed intelligence from all sources, including EW and SR is kept in system databases.

b. **Information Storage and Transmission.** The system keeps and transmits information. Commanders and staff who have access rights are able to access information in databases and communicate using the system.

c. **Information Analysis and Translation.** The system will provide battlefield awareness by performing analysis and translation of information and intelligence.

d. **Synchronised Military Planning and Execution.** The system will have facilities for activities of planning, execution and monitoring of military operations.

e. **Optimum Tempo and Maximum Effect.** The system facilitates the performance of military operational activities with optimum tempo and maximum effect.

**Objective.** The most important objectives of a NCW system should be as follows:

a. **Information Sharing.** The system provides facilities for information sharing at all levels within a command and its network covers the entire area of responsibility. Databases of different sub-systems are accessible to all qualified users within the command.

b. **Quality and Timely.** The system provides quality and timely information to users. It has efficient intelligence gathering and analysing capabilities.

c. **Situational Awareness.** The system must provide information on situational picture of own and friendly forces, enemy disposition and all relevant battle field incidents. Battle field pictures are made available to all commanders and staff.

## NCW DEVELOPMENT

**Development Concept.** Some military forces have started to develop their NCW. They have discussed at various seminars their development concepts, difficulties and achievements. They shared their aspirations and experiences, especially in the field of technology application to military operations. Experiences of these military forces in NCW development are similar. The study and development are done by the military and own local industry. The act of customising existing and commercial facilities to fit into operational needs, but with high level of security protections, is most logical. It is similar to the development of previous command and control systems. Details of their development concepts are as follows:

a. **Joint Project Team.** A joint project team is established between the military and the local industry, to formulate requirements and specifications. The military takes the lead and provides objectives and directions for the study. The industry will advise on the technology application and to be prepared for development work. No foreigners are involved.

b. **Develop by Local Industry.** The local industry develops the system. NCW systems are highly classified and sensitive; the main consideration is therefore security. The local industry is staffed by local citizens, and that the military is able to verify security vetting of the personnel who are to work on the project. Systems and equipment to be integrated into the NCW are installed by the trusted local industry. Later these same people will do maintenance and enhancement.

c. **Adequate Protection.** A command and control system is the most vital system to the military. It must get the best protective measures and defences the money can buy. NCW

protective measures are developed by the local industry and not much will be revealed.

d. **Enhancement of Existing Systems.** Development of NCW systems is a progression from existing command and control systems towards meeting current needs. Enhancements and customisation of existing systems are easily done, guided by enhancements plan and meeting current operational needs.

e. **Fit Doctrine, Concept and Contingencies.** NCW system to be developed will have to take into consideration present and future requirements of doctrines and concepts as well as contingency plans.

f. **Implementation in Phases.** NCW systems are implemented in stages. Pilot projects will be introduced, and only implemented when they are stable and workable. This method will avoid wastage and permit time for accurate development of new requirements.

**NCW Implementation.** Some military forces have started to develop their NCW systems, in methods as mentioned below.

a. **Experimentation and Partner with Local Industry.** The US Army Homeland Defence within the W300 Army Programme used Mitra Corporation as the Army's partner in NCW development. The Mitra Corporation representative for the programme explained many models of various NCW capabilities have been developed and demonstrated to the Army.<sup>4</sup> Another team from Global Defence and Space Group started developing strategic NCW for the US with Cisco Systems as one of the partners.

b. **Development and Integration Current Systems.** An example of NCW development through integration to current systems is to look at what is being done for the British Army. Lt Col Jeremy Wilson R Signals, SO1 Concept, Directorate of Land Warfare mentioned at Battlespace Information 2003 Seminar at

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<sup>4</sup> Presentation by F Stein, Dep Manger C3 Battlefield Systems the Mitra Corporation, at Battlefield Information 2003 seminar, Brussels, Belgium, March 2003.

Brussels, that the existing command information system (CIS) would be upgraded to NCW by 2010 by integrating the following current systems and some new systems. Some of the systems he mentioned are as follows:

- (1) BOWMAN - Joint tactical radio network.
- (2) Com-Bat (battle management system).
- (3) FALCON - High capacity area comms for formation HQ.
- (4) Multilateral interface programme (MIP) to enable coalition data transfer.
- (5) CORMORANT – Join Theatre WAN.
- (6) Near real time tactical data links (Link 16 and Joint effects network).
- (7) High capacity sitcom for reach-back capability (Skynet V and DBS).

Some systems mentioned above have been in service since the 80s and 90s, whilst the CORMORANT was planned for introduction in 2004 by stages from small to large scale.

**c. Peculiar to Specific Needs.** No one NCW system fits all. From the British example mentioned above, the NCW being planned for the British forces will not support any other military force. Obviously command and control for one military is different from that of the other, and different for one situation to another even from the same military and service.

**d. Multi-layered for Different Command Levels.** Systems for command and control functions are developed in layers, to suit different levels of command. At higher level bigger band width is required for more functions.

Examples are those of the British<sup>5</sup> and the US<sup>6</sup> armies as shown below (figures 1 and 2). The British has different layers of communications, to suit each level of command and control functions requirement. Lower level command headquarters are more mobile than the higher command headquarters.

**e. Develop in Phases.** Military forces are implementing their NCW programmes in phases during the periods of 2000 to 2020. Implementation by the Australian Military Forces (ADF) will be as shown in the diagram at figure 3<sup>7</sup>. Figure 4 shows implementing plans by some countries, complied from various NCW seminar presentations.

**f. Use Commercial Products.** Adaptation of hardware and software from commercial-off-the-shelf (COTS) is most common. Use of fibre optics lines to link together strategic commands is most economical, efficient and secure from EW and IW threats. Semi-mobile and mobile systems deployed in vehicles and cabins may still be able to use lines partially. Where lines are not possible commercial radio links may be an option. Military radio links are used only in combat zones. COTS software applications are relevant for functions of messaging, geographical information system, office automation, multimedia and briefings.

**g. Communications.** Multi links communications would be the choice. More than one means is required to provide diversity and redundancy, to guarantee communications. Dedicated communications is planned for as appropriate, but with sufficient band width.

**h. Focus on Army Systems.** Most of initial NCW implementation programmes of these military forces are focused on the army requirements. Figures 1 and 2 are good examples of what have been developed by the US and the UK forces. It is understandable that network for ground troops are easier to implement than those of the naval and air forces.

<sup>5</sup> Presentation by J Turton, Project Leader Theatre & Formation Comms System, Defence Procurement Agency UK, at Battlefield Information 2003 seminar, Brussels, Belgium, March 2003.

<sup>6</sup> Presentation by Col T Cole, Win-T Project Manager US Army, at Battlefield Information 2003 seminar, Brussels, Belgium, March 2003.

<sup>7</sup> Presentation by Lt Col Mike Barry, Deputy Director NCW Implementation, ADF, at NCW seminar, Kuantan, Dec 2004.

From the army NCW it will have links to the other services and grow into joint NCW.

i. **Operational/Tactical Systems Linked To Strategic.** NCW developments would start from operational or tactical networks. Strategic NCW are last to be developed. Operational NCW systems would link to strategic systems later. Command structures and defence systems

at strategic levels are massive and sophisticated. Information systems would have input sources from huge and widely spread systems. Strategic NCW would be more difficult to develop. Different services have different ways of doing businesses and there are always difficulties in inter-service sharing of information.

### Comms for NCW

#### UK ARMY NCW-Theatre and Formations Communications

#### JOINT AREA OF OPERATIONS COMMUNICATIONS HIERARCHY

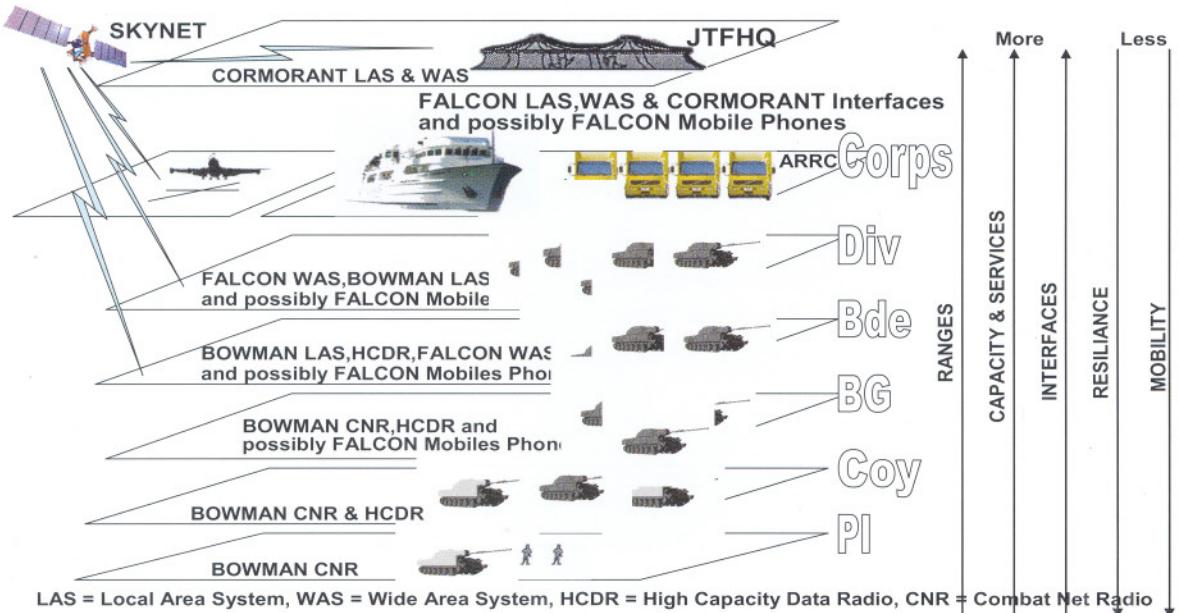


Figure 1. UK Army NCW Communications

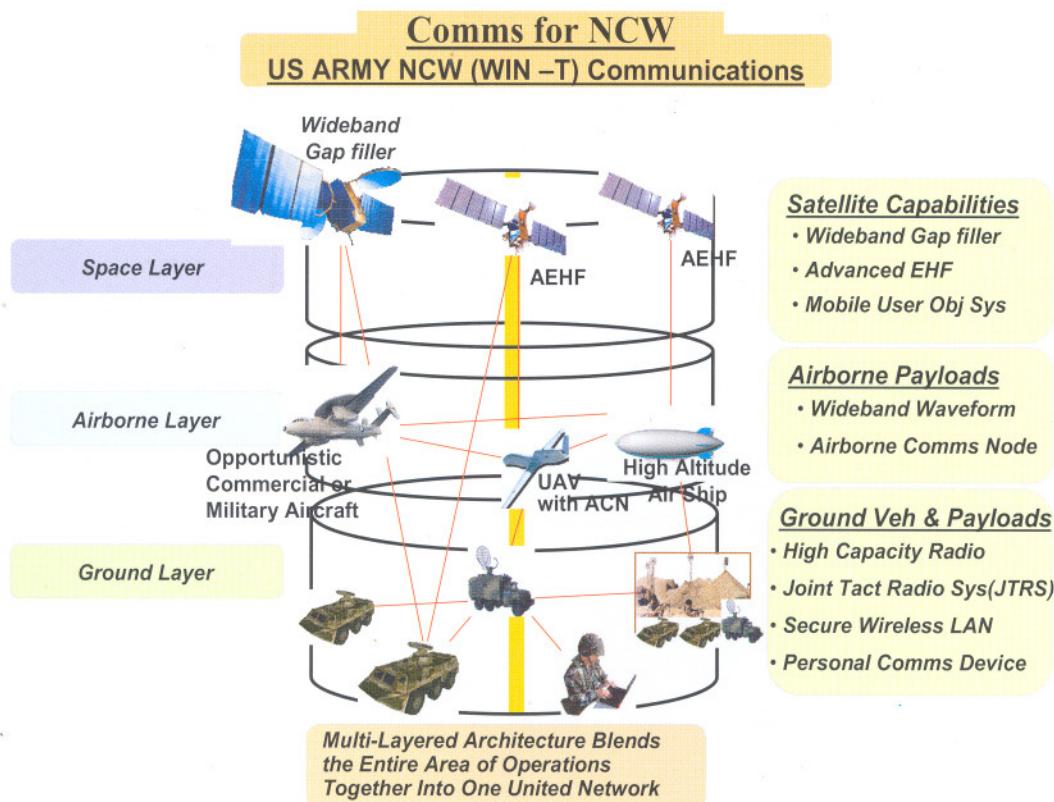


Figure 2. US Army NCW Communications

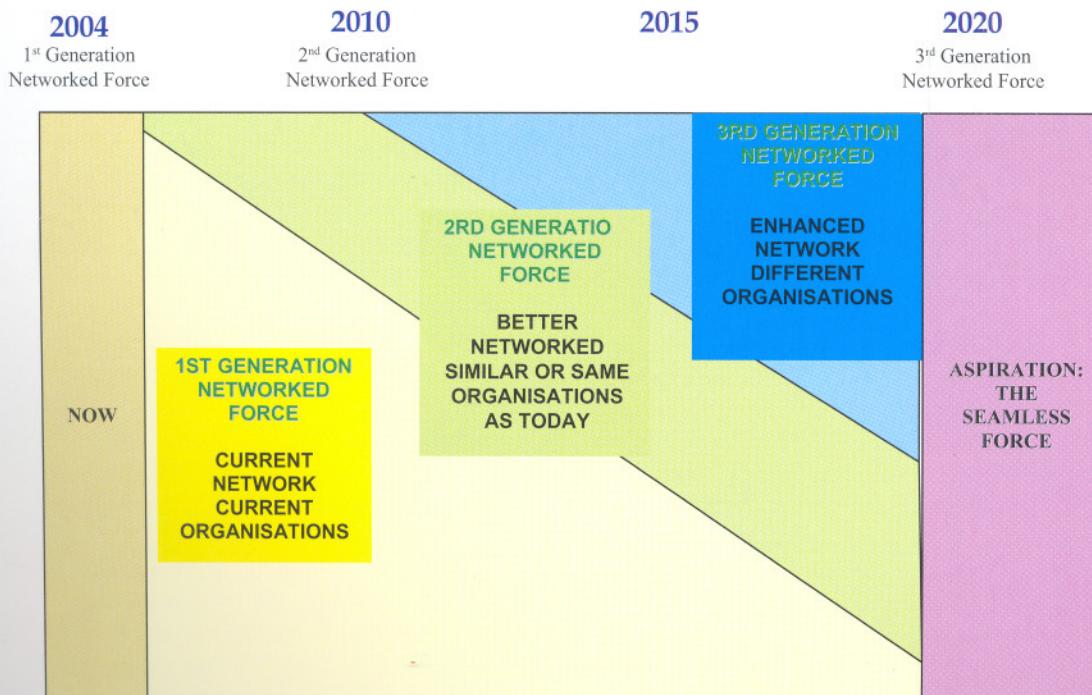


Figure 3. Implementing NCW-ADF

Nations	Models	Maturing Date
US	✓ Network Centric Warfare (NCW) ✓ Experimentation	2020
UK	✓ Network Enabled Capability (NEC) ✓ Partnership with Industries ✓ Experimentation	2020
Germany	✓ Transformation or becoming irrelevant ✓ Joint Force ✓ Coalition Force	2020
Australia	✓ NCW/NEC + Knowledge Analysis Framework ✓ Learn by doing ✓ Current focus on land	2020
Israel	✓ Start by using current resources	2015

Figure 4. Implementing NCW by Nations

## LOCAL NCW DEVELOPMENT

**Why Local Industry.** NCW are defence systems, must be assured that they are effective in times of war. There must be no slightest chance that these systems are being embedded by illegal chips that could render these systems ineffective when you need them most. Next is to make sure systems are efficiently maintained and enhanced regularly, keeping abreast with, operational needs, threats and advancement in technology. To meet these requirements the military would need their own reliable local industry as partners in development. Through partnership with local industry the military can expect that information related to the NCW systems will be protected from being known by others. Information on capabilities and deployment of surveillance, reconnaissance and weapon systems, and contingency operational plans will be guarded. Furthermore local industry would be familiar with local threats, environments, and security scenarios. Continuous support in R&D, maintenance, enhancement, training and system operation during crisis and exercises are assured

from the local industry. Costs will be much lower too when systems are done by locals.

**Roles of Local Industry.** In developing NCW for the home defence forces, utilising own local industry offers advantages. Some of the roles of local industry are discussed below:

a. **Source of knowledge.** Local industry is the best source of knowledge in technology. Professionals in industry stay longer in their jobs than those in the forces, thus knowledge will remain intact for much longer. These personnel are able to work on R&D to develop requirements. They can be employed to train and transfer technology to the servicemen.

b. **Partnership with Military.** Reliable local industry can be a partner to the military. It has to be a smart partnership for a long term venture. It is costly for the industry to develop technical capabilities; therefore it must be assured of a reasonable period of business.

**c. Joint Development.** The programme will start with a joint study of requirements and to prepare user requirements and specification. Then the joint team will design, develop and customise third party products. Integration to operational systems will be done jointly.

**d. Maintenance.** The local industry partnership will continue to include maintenance and enhancement. Initially the industry will do all levels of maintenance. Later the military will assume some levels of maintenance and the industry will do only the base level repair. Enhancement is done to accommodate latest changes in threats, strategy, tactics, doctrines and technology.

**Factors for Implementation.** There are factors to be considered to ensure NCW systems are developed correctly and meeting requirements. Some of these factors are mentioned below.

**a. Commanders' Needs.** Identification of commanders' requirements is vital to ensure development is correct. These requirements are statements of command and control capabilities that will satisfy operational commanders' needs under all possible operational scenarios. From these requirement statements then specifications are formulated.

**b. From Existing Systems.** Progression to NCW is best to start from existing systems, with well defined secure and functional frameworks. Facilities for information sharing and connectivity to surveillance, reconnaissance and weapon systems need to be developed.

**c. Build Missing Bricks.** Missing capabilities, facilities and connectivity identified are then developed as pilot projects and integrated to existing systems for trial. Once they are approved as being suitable, they are extended to the rest of the networks.

**d. Modify Existing Systems.** Existing systems are enhanced and modified to achieve a high level of integration, security, technology and meeting needs. Man-machine-interface and applications are upgraded with latest versions, to make systems friendlier and popular.

**e. Maintenance Contract.** NCW development is a logical progression for command and control systems. It is an enhancement to existing systems and not a new development. Military forces would utilize existing maintenance contracts to develop new software requirement and replacements of old equipment and security features. There may be some requirements of new equipment for surveillance, reconnaissance and weapon.

**f. NCW from Existing C4I.** Transforming existing C4I systems into NCW will be very easy. Evolving towards full NCW information sharing functionality from existing systems can be done in a short time. All system owners would need to give their concurrent to share information and implementation is by software modification. Integrity of information will be through the use of access right to authorised users.

**g. EW/IW Protection.** Threats from EW and IW efforts are information gathering, for development of counter measures. In war the main threat is destruction, electronically or by force. NCW promotes information sharing and integration of systems, allowing more users having access to bigger networks. This will increase avenues for potential EW and IW attacks. Development programmes of NCW systems will require plans for EW and IW defences, as well as plans for their future continuous security enhancements.

**h. Implementation Phases.** A military force will need many NCW systems, for varied situation and scenarios. These systems will be identified and will be developed in phases. Experiences gained from earlier developments will be used in later developments.

**i. Centralised Control Decentralised Function.** NCW networks will need to be centrally controlled at the highest levels of command for ease of management. However each independent system, each local area network and each terminal are decentralised with the ability to function independently when other parts of the network are down or faulty.

j. **Redundancy and Duplication.** NCW systems will require numerous redundancies in network connectivity for communication assurance. When one link fails, due to congestion, line faulty or enemy action, there will be alternatives. There will be duplication in data bases too, to ensure replicated data is available for use after recovery from system failure.

k. **Strategic, Operational and Tactical Systems.** Military will need different NCW systems to satisfy its strategic, operational and tactical purposes. Different scenarios will require different NCW systems for different connectivity to provide information sharing to relevant commanders, formations and units.

l. **Non-Military Equipment.** Some equipment used in NCW systems may not be of military specification. COTS products may be suitable, with some modification in some cases, to strengthen for the purpose of vehicle installation.

m. **Maintainability.** Systems introduced into service must be locally supportable, or else they will have short shelf life and expensive maintenance. Foreign maintenance of defence systems is the worst option for reasons of security, integrity and reliability.

n. **Foreign Support for Integration.** Integration of surveillance, reconnaissance and weapon systems to NCW network will require support from original equipment suppliers.

## NCW POSSIBLE WAY AHEAD

**Existing Strategic System.** It would be easy for any military to move forward towards the NCW realisation if it has an existing strategic C4I system. Such a system has joint and single services applications. Information sharing may be realised by allowing information accessibility of one service to users from other services. Further improvement to information sharing will be in the form of system expansion to more users of lower commands and headquarters. Additional applications to support information sharing and decision making may be added to the system.

**Linking to Other Systems.** The second NCW requirement is to have the three systems: information (C4I), sensor (surveillance and reconnaissance systems) and shooters (weapon systems) linked together. Information from these systems is accessible to users from all the three systems. Linking all other existing defence, sensor and weapon systems to the C4I systems is to complete the NCW network of a given scenario. Air defence systems, surveillance radar systems and missile systems may be integrated to the C4I system forming the NCW.

**Tactical Systems.** There are requirements to have tactical or operational NCW systems. These are systems to support tactical and operational commanders in combat. Some are for joint operations and others are single service in nature. Some are to support routine peace time operations, whilst others are to support specific operations for national defence, for United Nation missions or to support civil authorities during calamity, natural disaster or civil disorder.

**Pilot Projects.** Development of new requirements for the NCW programme requires pilot projects, based on user requirements and supported by technology from the local industry. The completed projects are installed within the network and put on trial for specific durations. Accepted and approved pilot projects are then installed to the rest of the NCW network.

**Local Industry.** Integration, customisation and development must be done by local industry, to ensure systems developed are safe and reliable to function during crisis and war time. Industry staff members are security vetted before involved in NCW programme. Joint development will further ensure the systems are reliable.

## THREATS TO NCW

**Priority Target.** Command and control systems are high priority targets for intelligence acquisition or for destruction. Militaries would have their surveillance and planning destruction capabilities over all command and control systems of opposing forces. The easiest way to monitor or destroy systems is by having chips embedded into the systems and to activate them when required. The

most likely time for these chips to be planted is when the systems are most vulnerable, during development and maintenance. Foreign agents would sponsor some relevant foreign and local industry to cooperate with them, to have illegal chips embedded into NCW system. Threats faced by command and control systems are those from IW and EW activities. Systems can also be destroyed by aerial bombing, artillery, mortar and commando raids.

**Information Warfare.** Threats from IW may be in the form of destructive, interference or information stealing, mainly through the use of software. The software for specific functions is inserted into NCW systems as embedded chips or through illegal access. The most convenient to the enemy and most difficult to detect by system owners would be embedded chips inserted during system development, maintenance and equipment repair. Enemy IW efforts are only successful if the enemy can have access or physical contact with the systems. These IW threats may have the following effects on NCW systems:

a. **Damage.** Enemy efforts may affect communications, storage & processing ability. Effects may be temporary and easily remedied or may be permanent and difficult to rectify.

b. **Intelligence Gathering.** Enemy may have means to intercept transmitted messages or to enter into storage systems to steal information.

c. **Disruption.** Enemy may aim at disrupting NCW systems by destructive measures or by interfering networks, links, data bases or transmitted messages. Data may be intercepted or extracted for intelligence and replaced with deceptive data to deceive valid users.

**Electronic Warfare.** EW threats are the manipulation of the electromagnetic spectrum on radio communication links and radar transmissions, in any of the following forms:

a. **Intelligence Gathering.** The efforts could be for gathering of signal intelligence (SIGINT) for long terms use, or for electronic support measures (ESM) for immediate combat use, for intelligence on strength and activities or

for electronic counter measures (ECM) to protect own troops from being hit by enemy missiles and bombardments. .

b. **Electronic Counter Measures (ECM):** Resulting from his successful ESM and SINGINT activities the enemy will be applying effectively his ECM disruptive measures of jamming and deceiving, or even will try to destroy your electronic defence systems.

c. **Aid to Combat.** EW is a valuable asset to combat forces. Very often it forms as part of weapon systems and combat platforms, or in support of combat troops deployed in battles. Enemy will be adequately equipped with EW capabilities to weaken our NCW.

**Activities to Counter Threats.** These EW/IW treats are real during peace time and during periods of tension, conflicts and war time. EW/IW assets to defence forces are necessity, without them defence forces are not fit for combat duties. For NCW systems the most vital is the electronic defences. For effectiveness they are planned during the NCW development planning. Their implementation will be the responsibility of the superior commander, who will be getting the services of the NCW being developed. Some of the factors to be considered are given below.

a. **Offensive & Defensive Capabilities.** Military forces must have effective offensive and defensive EW/IW capabilities. Defences are only effective if they are supported by offensive activities of intelligence gathering and destructive counter measures. Capabilities are effective if their developments are guided by needs, threat scenarios and technology. These capabilities will remain effective if they are regularly enhanced and upgraded.

b. **Continuous Qualified Personnel.** Military must have personnel who are qualified and are receiving continuous and regular training, to be current on technology and threats.

c. **Partnership with Local Industry.** Military needs the support of local industry to ensure of the above mentioned two factors. The local industry that will ensure the defence forces

are equipped with effective EW capabilities at all times. The industry retains its personnel and have them updated with latest technology, but the military supports with needs. The best venture is a smart partnership between the military and the industry.

## SUMMARY

**NCW is Concept not Product.** NCW is a new military concept for command and control systems. The concept had evolved out of the progress in the application of information and communication technology by the private sector. It is a very valuable and good concept. NCW is intended to provide wider and easy access to information by all commanders and their supporting staff, to aid them in planning and making decisions. The NCW networks integrate information, surveillance and weapon systems. NCW is for improvement, the military must go for it.

**Not New, Re-Packaged & Enhanced.** Command and control networks for military are not new. They have been in service with military forces since the 60s, under different names. Progressively these networks were enhanced, upgraded and integrated to other networks and systems. The element that is not linked to the present C4ISR networks is the shooter or the weapon systems. The NCW brings weapon system users into the network for them to have access to network information and information in the weapon systems to be shared with others.

**Develop For Specific Need.** There is no off-the-shelf NCW. Systems are developed for specific needs, facing specific threat scenarios and to be

deployed in predetermined theatres for specific tasks. There are hardware and software readily available in the market to perform certain functions, but software will not be adequate to meet military requirements without customisation. There will be specific software requirements for some peculiar functions and for integration. The specific to task software will have to be developed, preferably jointly by the selected industry and the military, to ensure it is accurate, maintainable, upgradeable and secure.

**Knowledge Foundation** The development of the system will start with requirement study, looking at scope and concept of operations, as well as force levels, operational responsibilities and operational plans. Some classified information will be discussed, thus foreigners will not participate. From the requirement study specifications will be formulated. These activities are best done jointly with local industry. It is successful if the military has personnel with adequate knowledge foundation of the military operations as well as the technology.

**Local Industry Support.** To implement NCW military forces need support from own local industry, for formulation of specification, development, customization, integration, maintenance, operations and enhancement. Systems will be relevant and cost effective.

**Secrecy Objective.** The NCW system to be developed must be accorded the highest level of information protection so that it is not easy for potential enemy to plan for any attack on the system. The system planning, design, development, integration, maintenance and enhancement are all done only by the military and the nominated trusted local industry.

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Jen Zaki's last military assignment was as the Asst Chief of Staff, Comms Electronic at the Malaysian Armed Forces HQ. Before that he was the head of EW Department at Defence Intelligence Staff Division. In those two positions he was responsible for the development, procurement, concepts, doctrines, operations, procedures, training and management of communications, electronic, electronic warfare (EW) and information technology support facilities. He has sufficient qualifications and experience in communications and electronic, EW and defence C2 systems. In the present company he is still involved and current in C2, NCW and EW activities.

# PEMAKAIAN SONGKOK DALAM REJIMEN ASKAR MELAYU DIRAJA



Oleh Lt Kol (B) Saiful Anwar bin Md Ali

## PENDAHULUAN

Rejimen Askar Melayu DiRaja (RAMD) adalah teras kekuatan Angkatan Tentera sejak dari dahulu hingga ke hari ini. Kompeni percubaan yang ditubuhkan pada 1hb Mac 1933 dan ditambahkan dengan beberapa kompeni lagi sebelum Perang Dunia Kedua telah menyertai tentera British untuk menentang kemaraan Jepun. Hasil dari penubuhan RAMD ini, maka kor-kor lain di tubuhkan mengikut keperluan dan kehendak semasa. Hingga kini RAMD merupakan teras utama kepada Tentera Darat Malaysia (TDM).



25 anggota skuad 'Kompeni Percubaan' yang pertama-  
18 Julai 1933

Penyertaan pelbagai bangsa dalam bidang ketenteraan di Tanah Melayu pada masa itu awal penubuhan telah menimbulkan berbagai penampilan pemakaian tentera bersesuai dengan budaya bangsa yang berada di Tanah Melayu pada masa itu. Perbezaan yang ketara adalah dari segi pemakaian kepala oleh tentera yang berada di Tanah Melayu pada masa itu. Tentera British pada awalnya lebih cenderung kepada budaya pemakaian *peak cap*. Tentera India dengan sarban (turban) dan Melayu dengan pemakaian songkok. Matlamat utama pemakaian ini adalah untuk

menampilkan ciri-ciri sebagai seorang tentera yang lebih berdisiplin, segak, berketerampilan selaras dengan budaya dan tradisi masing-masing.

## SONGKOK DAN MELAYU

Sebagai pemulaan, adalah lebih baik sekiranya istilah songkok dan Melayu dikupas terlebih dahulu serta menzahirkan kaitan di antara songkok dan orang Melayu itu sendiri. Songkok mengikut istilah adalah pemakaian kepala yang ringkas, berbentuk bulat atau lonjong, rata di bahagian atas dan berkeadaan rendah, diperbuat dengan tegap menggunakan kain baldu, kapas atau kain sutera dalam pelbagai warna. Pemakaian songkok bagi orang Melayu bukan sahaja menggambarkan keteguhan pegangan agama seseorang, tetapi juga menunjukkan cinta yang sejati kepada bangsa dan di samping itu songkok membantu orang yang berumur kelihatan lebih segak dan ia juga dapat membantu melindungi rambut yang mula beruban atau kepala yang rambutnya mulai gugur. Besar kemungkinan songkok Melayu merupakan ilham daripada gabungan tarbus dan songkok dari India, dan amat sesuai dengan watak orang Melayu yang lembut dan sederhana. Almarhum Sultan Abu Bakar dari Negeri Johor pada tahun 1920 adalah orang yang pertama menyarankan supaya songkok dijadikan pakaian kepala.

Melayu adalah satu nama khas bagi satu kelompok suku bangsa di sekitar kepulauan Melayu ataupun nama am bagi pelbagai kelompok serumpun bahasa di kalangan kelompok bangsa Melayu-Polinesia (Austronesia) sebagai nama khas. Kelompok Melayu mendiami wilayah-wilayah Semenanjung Tanah Melayu, Singapura, Selatan Thailand, Persisiran Timur Pulau Sumatera, Pesisir Pulau Borneo dan wilayah-wilayah lain di kepulauan Melayu (Nusantara) sebagai kelompok am. Bangsa

Melayu terdiri daripada berbagai suku bangsa yang bertutur dalam bahasa Melayu, ianya terdiri dari suku seluruh alam Melayu dari Filipina hingga ke Irian, Sumatera dan Kemboja.

Oleh kerana pencetus idea pemakaian songkok ini datangnya dari istana, maka orang Melayu yang terkenal dengan sikap taat setia kepada raja menganggap bahawa pemakaian songkok merupakan satu kewajipan yang akhirnya menggambarkan identiti bangsa Melayu itu sendiri.

Pemakaian songkok oleh anggota Rejimen Askar Melayu DiRaja semasa awal penubuhan merupakan pemakaian kepala yang sangat dibanggakan, sesuai dengan budaya dan adat resam bangsa Melayu. Semasa pendudukan Portugis pada tahun 1511, ianya telah dipakai oleh pelbagai bangsa yang berdagang di sini, walaupun ianya dari pelbagai bentuk dan corak, matlamat utama adalah sebagai adat untuk menutup kepala. Songkok telah dikaitkan dengan jati diri dan kesopanan bangsa orang Melayu. Orang Melayu tidak dapat lari dari menggunakan songkok sebagai pakaian menutup kepala, kerana dari sudut agama ianya bertujuan untuk mengelak rambut menutupi dahi ketika sujud semasa mengerjakan solat. Songkok telah dijadikan sebagai pakaian kebangsaan negara ini dan ianya dipakai ketika majlis rasmi kerajaan, sembah mengadap Sultan, perkahwinan, Hari Raya, pengkebumian jenazah dan pelbagai upacara.



*J.W.W Houghes di Perbarisan Kompeni Percubaan Askar Melayu -1933*

## SEJARAH

Sebelum tertubuhnya pasukan Askar Melayu, Pasukan Sukarela Melayu telahpun wujud sejak tahun 1902, namun ia bukan pasukan tetap dan sepenuh masa. Pasukan ini ditubuhkan dan dianggotai oleh kebanyakan pegawai-pegawai serta kakitangan kerajaan yang dianggap sebagai aktiviti luar sahaja. Ini adalah kerana pihak British berpendapat bahawa orang-orang Melayu tidak layak menjadi tentera. Mereka bimbang sekiranya orang-orang Melayu yang diambil berkhidmat dalam pasukan tentera akan bersikap menentang dan memberontak. Selain itu, pegawai-pegawai British sendiri meragui bahawa perangai orang-orang Melayu yang dianggap suka berpeleseran, malas dan tidak mewarisi tradisi ketenteraan pasti akan memberontak dan menentang terhadap disiplin ketenteraan yang diperkenalkan oleh British.



*Askar-awak "Malay States Guards" yang memukul British berbelanggung 1933*  
Untuk pertahanan



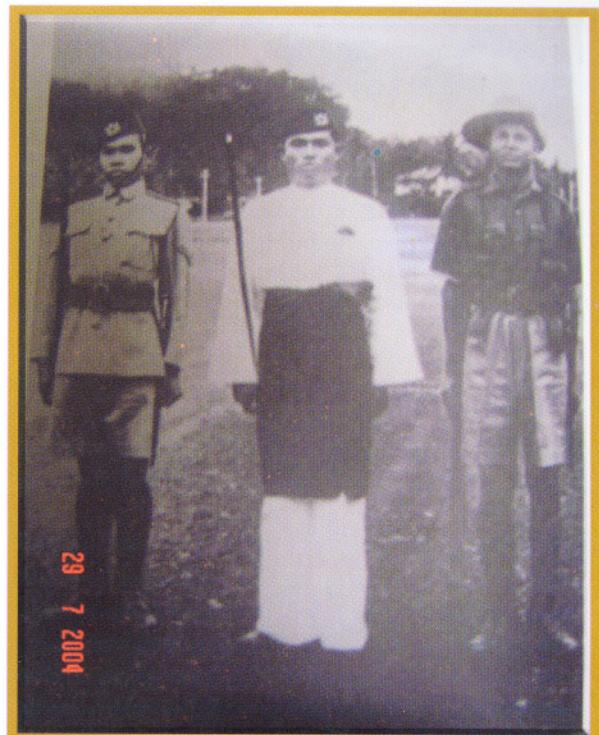
*Malay States Volunteer Regiment (M.S.V.R)-1930*

Perkara ini tidak menyenangkan Raja-Raja Melayu pada masa itu dan merasa kecewa kerana pasukan keselamatan hanya terdiri dari golongan bukan bumiputera. Cadangan dan desakan telah dibuat oleh Pasukan *Malay States Volunteer Regiment* (M.S.V.R) agar penubuhan pasukan Askar Melayu diwujudkan. Pegawai Kanan British, Arnold Bailey menyokong agar penubuhan Askar Melayu dipandang dengan serius kerana bukti kecemerlangan telahpun dipamerkan oleh Pasukan Polis dan Askar Timbalan Setia Negeri Johor.

**Pemakaian Peak Cap.** Peak Cap dipakai sebagai penutup kepala semasa memakai pakaian No 2 (Bush Jacket) bagi semua pegawai dan juga SMR di dalam perkhidmatan TDM. Bermula dengan pendudukan British di Tanah Melayu, pegawai-pegawai British telah mula memakai peak cap bersama pakaian seragam tentera semasa perbarisan, lawatan dan juga aktiviti rasmi yang diadakan di pasukan atau luar pasukan.

**Pemakaian Songkok.** Songkok merupakan penutup kepala yang telah lama digunakan oleh orang Melayu sebelum penjajahan British di Tanah Melayu. Ianya merupakan warisan, simbol serta identiti bangsa Melayu. Kebiasaannya diperbuat daripada baldu dan berbentuk bujur seperti kapal dan dipakai oleh kaum lelaki Melayu semasa upacara istiadat dan lain-lain upacara. Pemakaian ini dikaitkan dengan kesopanan, keyakinan, budi bahasa, lambang kemelayuan dan juga sebagai penutup kepala. Tradisi pemakaian ini masih lagi digunakan sehingga sekarang di dalam pelbagai bentuk dan perhiasan sebagai simbol sesuatu perkhidmatan agar ianya menampakkan kekemasan kesegakan dan juga mengekalkan budaya serta tradisi Melayu.

Songkok merupakan pemakaian tutup kepala yang telah dipakai oleh anggota bawahan dan juga pegawai semasa mula penubuhan Askar Melayu. Songkok dipakai bersama pakaian istiadat dan pakaian kerja. Songkok menjadi pakaian gemilang yang dipakai bukan sahaja oleh anggota dan pegawai Melayu, malahan pegawai-pegawai British juga turut mengenakan songkok ini sebagai pakaian harian. Pegawai British tidak merasa kekok dengan memakai songkok sebagai pakaian harian malah mereka turut rasa berbangga kerana tradisi pemakaian orang Melayu ini dapat dikongsi bersama oleh mereka.



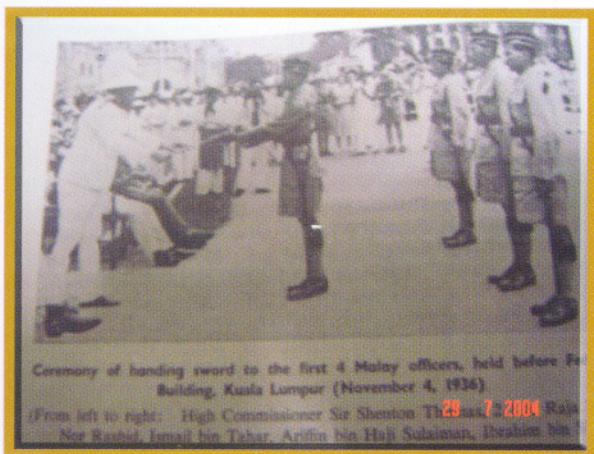
Tiga jenis pakaian bagi Askar Melayu pada peringkat awal, Pakaian Perbarisan



Anggota Kompeni Percubaan bersama Lt Kol G. McL Bruce

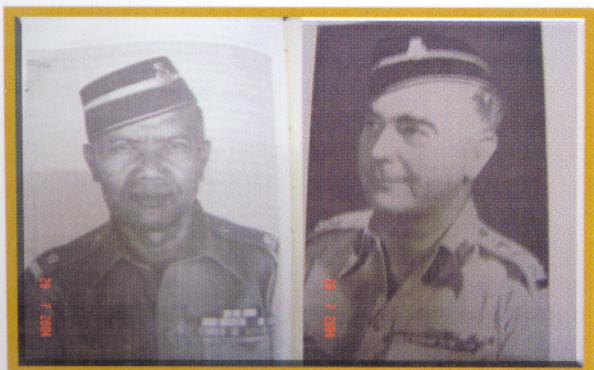
Walaupun songkok menjadi pakaian utama pasukan Askar Melayu pada masa itu, terdapat juga pegawai tertinggi British yang memakai peak cap pada pakaian kerja harian mereka. Walau bagaimanapun, songkok masih dipakai dengan pakaian istiadat bagi upacara perbarisan dan penganugerahan pingat. Empat orang anak Melayu yang pertama di dalam Rejimen Askar

Melayu DiRaja yang telah dilantik menjadi pegawai ialah 2/Lt Ibrahim bin Sidek, 2/Lt Ismail bin Tahar, 2/Lt Ariffin bin Haji Sulaiman dan 2/Lt Raja Lope Nor Rashid begitu segak sekali dengan pemakaian songkok semasa majlis penyerahan pedang di hadapan Bangunan Persekutuan.



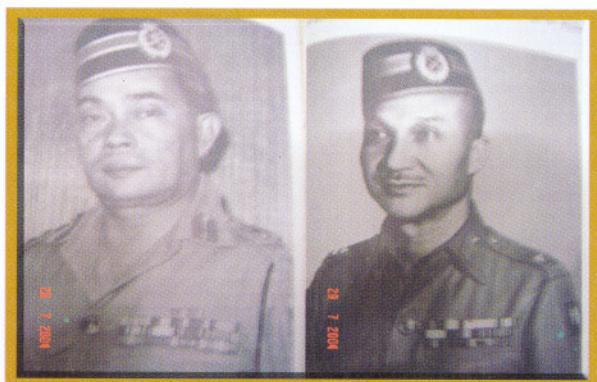
Empat anak Melayu ditauliahkan sebagai pegawai- 4 Nov 1936

Pemakaian songkok telah menjadi kebanggaan Askar Melayu mulai tahun 1933 sehingga 1947, keberanian Askar Melayu bukan hanya terletak kepada usaha membanteras komunis, tetapi kesegakan berpakaian menjadi lambang keteguhan dan keutuhan bangsa Melayu. Semasa awal penubuhan Askar Melayu, kebanyakan upacara rasmi yang melibatkan pegawai Melayu dan British memakai songkok sebagai penutup kepala. Ini jelas menunjukkan bahawa songkok sesuai dipakai dalam apa juga upacara.



Kapten Nayan (kiri) dan Lt Kol J.R.G Andre (kanan) ketika Perang Dunia Kedua meletus

Sebagai perbandingan, Tentera Diraja Brunei juga memakai songkok semasa memakai pakaian *Bush Jacket* dan pakaian istiadat. Ini menunjukkan bahawa mereka merasakan bahawa memakai songkok merupakan pakaian tradisi yang bersesuaian dan harus dikenalkan seiring dengan budaya Melayu Brunei dalam mengekalkan nilai-nilai dan adat-adat ketimuran.



Leftenan Jeneral Tunku Usman Jewa (kiri) dan Brig Jen Hamid Bidin



Tiga sahabat dari kumpulan 17 Leftenan Muda Abd Manan (kiri), Leftenan Muda Hamid Bidin (kanan) dan Leftenan Muda Maulud Abd Samad - 1947

Perubahan juga telah berlaku dari segi pemakaian sejak penubuhan Askar Melayu mengikut arus semasa. Pemakaian songkok telah ditukar kepada peak cap dan songkok hanya digunakan bagi upacara mengadap sembah Sultan, upacara pengkebumian dan lain-lain acara istiadat.

## PENUTUP

Setelah hampir 50 tahun negara Malaysia mencapai kemerdekaan dan selama itu juga ketuanan Melayu telah diserahkan semula kepada bangsa Melayu. Peluang ini sepatutnya telah digunakan oleh bangsa Melayu untuk memartabatkan semula dan membebaskan diri dari budaya dan ciri-ciri bangsa penjajah dalam semua aspek kehidupan. Pemakaian songkok akan dapat mengimbas kembali pemakaian songkok sebagai pemakaian awal semasa penubuhan Rejimen Askar Melayu DiRaja. Ini telah dibuktikan oleh 25 anak Melayu yang mula memakainya.



*Lt Ibrahim Alla Ditta (kiri) dan Kapt Nayan (kanan)  
berpakaian songkok*

Ianya juga sebagai satu simbol pengenalan, penghormatan dan memartabatkan bangsa Melayu. Ianya juga dipakai oleh pegawai kerajaan yang terlibat di peringkat antarabangsa. Pemakaian songkok menggambarkan lambang jati diri bagi bangsa Melayu. Orang Melayu akan lebih nampak berkeyakinan semasa memakainya. Oleh itu pemakaian songkok dilihat sebagai sesuatu yang amat wajar dan harus dilaksanakan dengan penuh kebanggaan. Pakaian ini merupakan pakaian yang dapat melambangkan keunikan dan mengekalkan ciri identiti bangsa Melayu itu sendiri. Warisan Melayu harus dikekalkan agar tidak ditelan zaman, seperti kata Hang Tuah 'Takkan Melayu Hilang Di Dunia'.



*Lt Adnan Saidi, gugur di Bukit Candu pada 14. 2. 1942.*

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Lt Kol (B) Saiful Anwar bin Md Ali telah ditauliahkan kedalam Rejimen Askar Melayu DiRaja pada 23 Feb 1985. Beliau pernah memegang berbagai jawatan dalam pasukan, Kor dan Markas Formasi serta jurulatih di ATMA. Memiliki Diploma Lanjutan Pengajian Strategi dan Keselamatan (UKM), Diploma Strategi dan Pertahanan (UM) serta memperolehi Ijazah Sarjana dalam bidang Kajian Dasar dan Keselamatan dari UKM. Beliau kini bertugas sebagai Pensyarah Kanan, Fakulti Sains Pentadbiran & Pengajian Polisi di Universiti Teknologi Mara, Kampus Kota Semarahan Sarawak.

# PENGURUSAN PROJEK JURUTERA: PENGALAMAN SERIBU SATU CABARAN



Oleh Mej Wan Ahmad Zamri bin Abdullah

## Sinopsis

Sebuah seksyen yang terdiri daripada anggota-anggota RAJD yang mempunyai pelbagai ketukangan adalah merupakan unit paling kecil RAJD namun berupaya untuk melaksanakan sama ada projek mendatar atau menegak, di lembah atau bukit-bukau, di daratan atau lautan dan ianya menepati motto kebanggaan RAJD - *ubique* (di mana sahaja). Peringkat perancangan adalah mengenalpasti rekabentuk dan sumber-sumber serta tenaga kerja projek. Seterusnya mengukur kawasan dan melaksanakan kerja-kerja tanah bagi pembinaan jalan atau tapak kem/bangunan diikuti dengan kerja-kerja pembinaan bangunan. Selaku entiti tunggal yang bertanggungjawab dalam tugas ini, semestinya aspek kemahiran kejuruteraan, profesionalisme dan etika ketenteraan adalah seiring bila mana warga Sappers terlibat dalam sesuatu Projek Jurutera.

## PENDAHULUAN

Rejimen Askar Jurutera DiRaja (RAJD) adalah salah satu daripada komponen Tentera Darat (TD) yang berperanan selaku pasukan bantuan tempur untuk membantu TD memenangi sebarang peperangan. Selain daripada itu, antara peranan dan tugas utama yang turut dijunjung oleh RAJD adalah memenuhi obligasi nasional dalam projek-projek pembangunan negara. Pengalaman-pengalaman yang dilalui telah memberi pengajaran yang cukup bermakna kepada warga RAJD yang juga dikenali sebagai sappers tatkala berhadapan dengan pelbagai cabaran, halangan dan ujian yang getir dalam menyiapkan sesuatu tugas projek.

Bagi agensi perlaksanaan projek awam sama ada terdiri daripada agensi kerajaan atau swasta, cabaran-cabaran konvensional yang lazimnya dihadapi oleh mereka adalah berkaitan dengan masalah perolehan tender projek, masalah kelulusan spesifikasi oleh pihak berwajib dan masalah peningkatan kos projek. Sebaliknya masalah dan cabaran yang dihadapi oleh RAJD adalah berkisar kepada perkara-perkara seperti notis memulakan projek yang singkat, tempoh

projek perlu dipendekkan, kemahiran anggota dan peralatan yang digunakan. Sungguhpun perkara-perkara tersebut kelihatan kecil, namun ianya adalah permulaan kepada satu detik kesukaran yang boleh berubah menjadi satu rentetan masalah yang panjang sekira tidak ditangani dengan baik. Ini disebabkan aspek-aspek utama dan fakt-fakta teknikal dalam proses pembinaan seringkali dikesampingkan oleh pihak-pihak yang terbabit bagi tujuan-tujuan tertentu dan secara tidak langsung akan mengubah haluan projek.

Dengan kesedaran sedemikian, artikel ini akan membincangkan cabaran-cabaran pengurusan projek melalui perspektif skuadron medan RAJD dengan menyusurgalur pendekatan pengurusan projek yang diperlakukan.

## SENARIO PROJEK-PROJEK JURUTERA

Bagi merealisasikan amanah dan tugas yang dipertanggungjawabkan ini, sepanjang sejarah penubuhan RAJD yang melewati setengah abad telah menyaksikan pelbagai projek dilaksanakan yang membabitkan organisasi-organisasi dalam

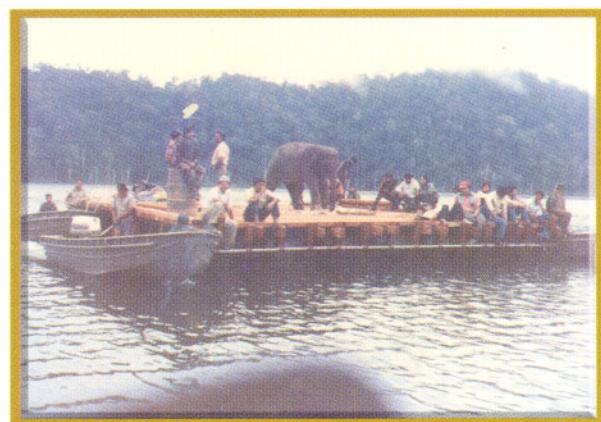
Angkatan Tentera Malaysia (ATM) dan juga pihak awam. Di antara projek-projek yang sinonim dengan RAJD adalah seperti pembinaan Jambatan Bailey Temerloh, Projek Dusun Tua, Projek Pulau Redang, Terumbu Layang-layang, Laluan Jip Gunung Tahan, Operasi Pemindahan Gajah termasuklah pembinaan *forward camp* seperti Kem Gubir, Pangkalan Hulu dan Padang Senai. Malah ratusan lagi projek-projek pembinaan sama ada mendatar atau menegak di seluruh pelusuk negara adalah manifestasi mengenai komitmen warga sappers yang terpahat dalam lipatan sejarah RAJD.

Adalah diperakui bahawa projek-projek yang dihasilkan oleh RAJD hanya berskala kecil dan tidak mungkin dapat menandingi kemasyhuran pembinaan KLCC, Kompleks Daya Bumi atau Jambatan Pulau Pinang dan jauh sekali untuk dikategorikan sebagai *Seven Wonders of the World* seperti Tembok Besar China, Taj Mahal atau Piramid Giza Mesir. Ini disebabkan binaan atau kerja-kerja yang membabitkan RAJD tidaklah mahal harganya, bukan canggih binaannya dan tidak juga tinggi nilai estetikanya. Tidak ada gahnya bagi satu Projek Perumahan Rakyat Termiskin (PPRT) atau pembinaan jambatan kayu sepanjang 50' di sebuah perkampungan kecil, sekadar projek untuk rakyat terutama dari kalangan berpendapatan rendah termasuk balu-balu dan golongan kurang upaya.

Seperkara yang perlu diingat dalam pembinaan projek, pada hakikatnya kontraktor awam memohon dan membida tender di mana lazimnya faktor ringgit dan sen serta untung rugi menjadi asas perkiraan dalam melaksanakan projek mereka. Oleh itu walau sekecil mana projek yang disanggupi oleh mereka mestilah memberi keuntungan yang lumayan dan tentunya bukan kerugian sama sekali. Adalah sukar untuk melihat syarikat-syarikat awam terlibat dalam projek-projek kecil seperti PPRT. Mana mungkin bagi mereka mengharapkan untung yang besar untuk sebuah rumah PPRT yang peruntukannya di bawah RM 10,000. Bagi RAJD pula, setiap perlaksanaan projek adalah satu tugas semata-mata apabila diarahkan dan ditaklidkan sebagai yang diberi tanpa perlu meminta, yang datang tanpa dicari dan yang akur bila diarah. Selaku organisasi yang bukan bermatlamatkan keuntungan, RAJD adalah pilihan terbaik untuk melaksanakan projek-projek sama ada yang perlu disiapkan segera atau projek tidak efektif kos sekiranya dilaksanakan

oleh kontraktor awam atau projek yang mempunyai dana yang kecil atau terpaksa bertindak sebagai *white knight* untuk menyiapkan projek-projek terbengkalai.

Dalam konteks perlaksanaan projek setelah diaturgerakkan semasa darurat atau bencana alam, RAJD perlu pantas membina rumah untuk mangsa-mangsa kebakaran, perlu cepat membina jambatan yang dihanyut oleh air bah besar dan mesti segera membina jalan yang tertimbus oleh tanah runtuhan. Dalam ertikata lain, persoalan masa tidak lagi penting apabila berhadapan dengan situasi yang genting dan memerlukan komitmen yang terbaik. Namun adalah kurang wajar semasa dalam keadaan aman damai, sekiranya perlaksanaan sesuatu projek dibayangi oleh keperluan-keperluan yang kurang munasabah di mana pada akhirnya menjelma menjadi permulaan kepada satu masalah. Sekiranya fenomena ini berterusan maka cabaran, halangan dan ujian getir yang dihadapi akan menjadi bertambah kompleks dan memerlukan satu kaedah pengurusan projek yang tuntas oleh pegawai dan anggota RAJD yang terbabit.



## KEKANGAN-KEKANGAN TRADISI

Dalam perlaksanaan projek terdapat pelbagai kekangan yang perlu dihadapi, secara tradisinya terdapat tiga kekangan yang dikenalpasti sebagai **skop**, **masa** dan **kos**. Ianya juga dikenali sebagai Segitiga Pengurusan Projek di mana perubahan yang berlaku terhadap satu kekangan akan memberi impak kepada kekangan yang lain.<sup>1</sup>

<sup>1</sup> <http://www.wikipedia/ the free encyclopedia/project management>

Kekangan masa adalah merujuk kepada masa yang ada untuk menyiapkan sesuatu projek. Kekangan kos adalah jumlah perbelanjaan yang diperlukan untuk menyiapkan sesuatu projek manakala kekangan skop adalah merujuk kepada aktiviti-aktiviti yang dirangka bagi menghasilkan produk akhir projek. Ketiga-tiga kekangan ini menyaingi di antara satu sama lain di mana penambahan skop secara tipikalnya akan turut berlaku penambahan masa dan peningkatan kos. Sekiranya berlaku pengurangan masa memungkinkan peningkatan kos tetapi berlaku pengecilan skop. Manakala bajet yang kecil boleh menyebabkan penambahan masa dan pengecilan skop.

Di samping wujudnya teori berkaitan antara kekangan yang boleh dibahaskan secara akademik dan menjadi kefahaman asas kepada pelajar dalam pengajian ekonomi atau pengurusan, kita dapat lihat satu pola kekangan yang unik berlaku dalam menguruskan projek pembinaan yang boleh dikaitkan dengan sistem hirarki ketenteraan. Sama ada pola tersebut memberi natijah positif atau sebaliknya, tapi apa yang pasti ianya adalah pemangkin kepada cabaran, halangan dan ujian kepada RAJD selaku agensi perlaksanaan projek dalam TD. Pemerhatian penulis dapat dikaitkan kepada perkara-perkara berikut:



**\* Keperluan Menyiapkan Projek Dalam Masa yang Singkat.** Lazimnya penugasan yang membabitkan RAJD adalah bersifat reaktif di mana sesuatu projek dilaksanakan hanya sesudah tercetus suatu keperluan yang diarahkan sama ada oleh formasi atasan atau pihak berkuasa awam yang merupakan pelanggan RAJD. Kebanyakannya tidak

dirancang di dalam kalender aktiviti pasukan dan pada kebiasaannya RAJD merupakan agensi yang paling akhir dirujuk untuk tujuan pembinaan pada saat-saat akhir. Hal yang demikian terjadi mungkin di atas tanggapan bahawa skala projek yang diberikan kepada RAJD pada umumnya kecil dan tidak begitu kompleks seperti pembinaan sebuah rumah berukuran 20' x 40' atau sebuah surau atau penyediaan tapak sebuah padang bola.

Adakalanya terdapat keperluan untuk memendekkan tempoh pembinaan disebabkan projek berkenaan akan disesuaikan dengan acara-acara utama yang terlebih dahulu ditetapkan. Contoh yang biasa adalah projek tersebut perlu disiapkan untuk diserah atau dirasmikan pada tarikh-tarikh tertentu. Di atas keperluan tersebut, terup RAJD akan diaturgerak dalam notis yang singkat dan akan membuat penyesuaian kerja bagi menyempurnakan misi mereka. Oleh itu persoalan masa yang ideal bagi aspek perancangan telah menjadi kurang penting di mana ruang masa yang terhad ini akan membataskan perancangan yang teliti dan juga kajian-kajian yang mustahak tidak dapat dilakukan. Justeru bagaimana RAJD menyempurnakan misi dalam tempoh yang ditetapkan dan dalam masa yang sama mencapai jaminan kualiti binaan adalah satu paradoks.



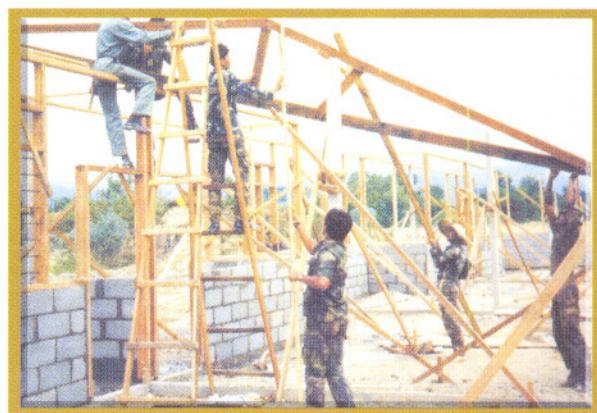
**\* Kemahiran Ketukangan Anggota.** Peranan dan tugas utama RAJD adalah membantu TD dalam operasi ofensif dan defensif di mana semua warga RAJD dilatih dan dipersiapkan dalam kerja-kerja kejuruteraan tempur. Majoriti anggota terdiri

dari pada ketukangan Jurutera Tempur manakala ketukangan-ketukangan yang lain adalah termasuk dalam kategori kejuruteraan awam, kejuruteraan jentera, kejuruteraan elektrik di samping ketukangan dalam komunikasi dan logistik. Sebagaimana anggota TD yang lain, warga RAJD tidak tertumpu kepada kerja-kerja berteraskan ketukangan semata-mata bahkan sebahagian besar masa diperuntukkan bagi aktiviti rejimental dan aktiviti sosial. Secara tidak langsung corak penugasan semasa dan rutin pasukan tidak banyak membantu anggota-anggota mendapat atau mengasah kemahiran-kemahiran dalam ketukangan masing-masing ke tahap tertinggi.

Berbeza di sektor awam atau swasta di mana kemahiran digunakan sebagai satu sumber mata pencarian khusus dan dilakukan untuk satu tempoh yang panjang dan insentif kepada peningkatan kemahiran adalah imbuhan dalam bentuk pangkat dan ganjaran. Umpamanya seorang Jurubina Bangunan Berasaskan Kayu di sektor awam akan memulakan kerjaya sebagai tukang kayu biasa dan mungkin akan menamatkan perkhidmatan sebagai Penyelia Bangunan Berasaskan Kayu. Perlu diingat bahawa pekerjaan dalam bidang tersebut dilakukan secara konsisten untuk puluhan tahun serta berupaya mencapai tahap kemahiran tertinggi. Secara umum sekiranya dibandingkan dengan pekerja awam, tahap kemahiran warga sappers adalah satu tahap terkebelakang walaupun mereka memiliki ketukangan yang sama. Walau bagaimanapun dalam aspek modal insan, warga sappers adalah *Jack of all trades* dan *well rounded* serta tetap menjadi antara aset utama TD. Namun apabila dikaitkan dengan hasil akhir kerja-kerja projek, kemahiran ketukangan akan menjadi satu bentukkekangan dan dilema seterusnya adalah bagaimana RAJD mendapatkan kepuasan bekerja dan jaminan mutu kerja projek dengan nilai estetika yang tinggi.

**\* Penggunaan Teknologi yang Moden dan Canggih.** Rekabentuk struktur binaan yang tidak begitu kompleks, saiz projek yang kecil dan kurang kekerapan penglibatan dalam projek pembinaan menjadikan RAJD tidak begitu dinamik dalam memaksimumkan

peralatan-peralatan yang berteknologi tinggi dan canggih. Justeru ianya telah sedikit sebanyak membantutkan kefahaman ke arah perkembangan yang menyeluruh dalam memahami penggunaan peralatan-peralatan yang berteknologi tinggi dan canggih. Malah kemasukan peralatan-peralatan tersebut ke dalam inventori RAJD sukar direalisasikan apabila penggunaannya tidak dapat diberi justifikasi yang kukuh. Keadaan ini merupakan satu kerugian kepada RAJD dalam tempoh jangka panjang. Di sini dilemanya adalah bagaimana RAJD dapat mengeksplor peluang untuk menggunakan peralatan-peralatan terkini dalam kerja-kerja pembinaan dan seterusnya menghasilkan satu projek dengan mudah dan secara profesional.



## MENANGANI KEKANGAN DAN CABARAN

Dalam mengatasi kekangan dan cabaran semasa perlaksanaan projek, seseorang ketua projek telah dididik untuk mengambil pendekatan terbaik dan penuh komited terhadap tugas. 5 faktor dominan bagi menghadapi sebahagian daripada cabaran-cabaran tersebut dapat diperincikan seperti berikut:

**\* Kepelbagai Gaya Kepimpinan.** Di awal tahun 1960an dan era pasca PERISTA di awal tahun 1980an menyaksikan kemasukan ke dalam perkhidmatan ATM terdiri daripada rata-rata pegawai berkelulusan MCE dan SPM. Dengan berbekalkan ilmu-ilmu dipelajari di Sekolah Jurutera Tentera Darat (SJTD) (sekarang Institut Kejuruteraan Medan

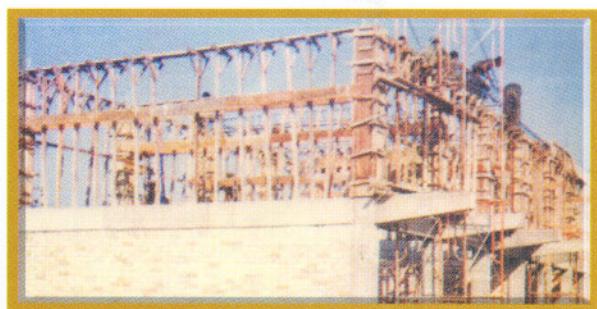
TD), di bahu mereka lah segala tugas projek dipertanggungjawabkan. Di samping tugas hakiki sebagai ketua terup, mereka turut memain peranan sebagai seorang perancang bandar, arkitek, juruukur, jurutera awam, jurutera ukur bahan. Tanggungjawab yang berat ini turut menuntut kematangan walaupun seorang pegawai sappers berpangkat Lt Muda, beliau semestinya boleh duduk berbincang mengenai sesuatu projek dengan Panglima Briged semasa melaksanakan projek dalam briged berkenaan. Beliau juga seharusnya boleh berinteraksi dan mempengaruhi seseorang wakil rakyat semasa melaksanakan projek dalam kawasan wakil rakyat berkenaan. Beliau merupakan wakil pasukan dan tindak-tanduk beliau adalah mencerminkan RAJD secara amnya.

Kepimpinan yang tegas tapi mesra terhadap anggota bawahan akan menjadikan seseorang pegawai sappers dihormati lagi disegani. Kepekaan terhadap kebijakan adalah perkara pokok dalam mentadbir anggota di kawasan projek. Walaupun ramai yang melihat perkara kebijakan tertumpu kepada cuti dan bentuk ganjaran wang sahaja tetapi aspek utama adalah dalam bentuk pentadbiran iaitu, pertama adalah melalui penekanan terhadap penjagaan kesihatan seperti kebersihan dan kekemasan tempat tidur, tempat makan, tandas dan kawasan tempat kerja. Penguatkuasaan peraturan-peraturan di medan sebagaimana yang dilakukan di kem seperti baris pagi, *bed layout* dan rutin yang lain adalah satu langkah yang akan memberi manfaat kepada semua pihak. Ini termasuklah rutin tambahan seperti baris makan ubat pansidar (ubat anti malaria) dan sistem pelupusan sisa makanan dari kawasan projek. Ianya wajar selagi berada dalam kerangka fleksibel kerana ramai berpendapat boleh berbuat apa saja apabila menjalankan tugas di kawasan projek dan menganggap rutin-rutin sedemikian adalah menyusahkan.

Kedua, aspek santai dan selesa iaitu menyediakan peralatan sukan, hiburan dan lain-lain peralatan bagi keselesaan anggota terutama selepas waktu kerja. Pada kebiasaannya kawasan projek terletak di kawasan terpencil, jadi ketua projek perlu

berusaha lebih untuk memberi keselesaan kepada anggota-anggota projek. Antaranya adalah mendapat bekalan air bersih melalui sumber pili bomba setelah diluluskan tanpa bergantung kepada sumber-sumber dari sungai atau perigi. Malah pada satu ketika dulu penggunaan peti sejuk medan yang menggunakan minyak tanah adalah pilihan terbaik untuk menentukan rangsum basah tidak rosak untuk tempoh yang lama. Penyediaan surau bagi anggota beribadat adalah satu usaha yang dapat meningkatkan aspek *spiritual* anggota dan sekaligus dapat menunaikan tanggungjawab agama seorang pemerintah kepada anggota bawahannya.

Ketiga, mengadakan sistem perbincangan dengan memanfaatkan waktu malam dengan semua ketua seksyen mengenai kemajuan projek. Dalam situasi santai, ruang untuk berbincang dapat dibuka dengan seluas mungkin apabila perbincangan tersebut dalam keadaan tidak formal. Justeru di samping pengetahuan teknikal, gaya kepimpinan yang *versatile* dan PR yang baik seseorang pegawai sappers adalah satu aset yang penting bagi mendapat kepercayaan pihak atas dan ketaatan anggota bawahan yang dipimpin.



\* **Matlamat Berorientasikan Sasaranku Langit.** Sasaranku langit yang tinggi...tiada gunung terlalu tinggi buat kami daki di siang hari, tiada jurang terlalu dalam buat kami turun di malam kelam... kamilah perwira remaja Malaysia adalah di antara lirik lagu yang berkumandang di Sekolah Tempur Pegawai Muda di awal tahun 1980an. Generasi demi generasi pegawai muda TD telah dilatih memfokuskan setiap misi tugas agar disempurnakan kepada tahap tertinggi. Lebih tepat bagi generasi yang pernah terlibat secara

langsung dalam operasi menentang pengganas komunis di mana mereka mempunyai dua pilihan sama ada membunuh atau dibunuh. Dalam perjuangan antara hidup dan mati, semangat lirik lagu di atas telah dihayati agar terus berpegang teguh kepada satu sasaran yang tinggi demi kelangsungan hidup. Tiada pilihan dalam tugas kecuali kita terus berusaha melakukan kerja-kerja tersebut walaupun orang lain tidak sanggup. Jika berpeluang pilih kalangan mereka yang terbaik dalam pasukan demi untuk mendapat hasil kerja yang terbaik dalam sesuatu tugas.

Rasanya tidak ramai yang sanggup masuk ke kawasan operasi sebaik sahaja menyiapkan projek seperti yang ditunjukkan oleh No. 1 Terup 1 Skn RAJD iaitu setelah selesai membuat projek jambatan di Baling, Kedah terus menjalani OP Kota Charlie Delta di Gubir tanpa balik ke pangkalan di Taiping terlebih dahulu. Pastinya kaum keluarga di pangkalan tidak dapat dimaklumkan kerana tiada kemudahan telefon bimbit, SMS atau *e-mail* pada masa itu. Tidak ramai yang mengetahui terdapat satu kumpulan tadbir yang hanya menggunakan bot tempur buatan Hong Leong Dockyard membelah ombak Laut China Selatan setiap hari untuk menghantar catuan dan alat ganti dari tanah besar ke penempatan Projek Pulau Redang. Betapa demi mencapai matlamat yang disasarkan, mereka yang terlatih akan sanggup mempertaruhkan jiwa dan raga demi melaksanakan tugas. Semasa dalam operasi menawan Manila semasa Perang Dunia Kedua, Jen MacArthur telah mengarahkan salah seorang panglima div;

*"Bob, I'm putting you in command at Buna. Relieve Harding. I am sending you in. Bob, and I want you to remove all officers who won't fight. Relieve regimental and battalion commanders if necessary, put Sergeants in charge of battalions and Corporals in charge of companies – anyone who will fight. Time is of the essence, the Japs may land reinforcements any night... I want you to take Buna, or not come back alive"*<sup>2</sup>

<sup>2</sup> Matthews, Lloyd J. & Brown, Dale E. The Challenge of Military Leadership. Virginia: Pergamon-Braseys, 1989. P.94

\* **Usaha Berterusan dengan Inisiatif yang Tinggi.** Perkataan keramat inisiatif digunakan dengan meluas di dalam TD yang merujuk kepada sesuatu usaha yang dilakukan dengan sedaya upaya untuk memperolehi atau menyiapkan sesuatu tugas terutama apabila perlaksanaan kerja tidak berjalan lancar sebagaimana yang dirancang. Bahkan *beg, borrow or steal* atau *I don't bloody care* merupakan ungkapan yang biasa dikeluarkan terutama oleh pegawai atasan kepada anggota yang memberi erti bahawa hanya satu pilihan, sesuatu tugas mesti diselesaikan walau bagaimana cara sekalipun.

Banyak cerita dan kisah seperti terup RAJD yang sedang melaksanakan projek di Kem Gubir telah keluar ke Sungai Petani tanpa kenderaan pengiring keselamatan semata-mata untuk mendapatkan dua tin cat<sup>3</sup>. Terup RAJD yang berada di Terumbu Layang-layang mengambil inisiatif bagaimana hendak membina tapak penempatan di terumbu di tengah-tengah lautan yang bergelora. Terup RAJD yang terlibat dalam operasi pemindahan gajah di Tasik Banding mengambil inisiatif bagaimana hendak membina dan melancarkan rakit gergasi walaupun tanpa kemudahan dockyard. Kesemuanya ini memaksa ketua projek mempunyai kefahaman yang tinggi dan inisiatif yang berterusan agar usaha-usaha mereka menjadi kenyataan sungguhpun tanpa pembelajaran formal dan tidak tercatat di dalam mana-mana buku teks. Dalam hal ini anggota-anggota projek seharusnya mempunyai kemahiran yang tinggi dalam aspek modifikasi dan penggunaan sumber-sumber tempatan.

\* **Kerja Lebih Masa.** Secara umumnya, persoalan masa dan waktu tidaklah menjadi perkara yang besar kepada anggota-anggota TD kerana telah terlatih untuk diaturgerak pada bila-bila masa, dalam apa jua keadaan, siang atau malam, panas atau hujan. Sehingga terdapat moto pengurusan masa yang agak tersohor di kalangan warga TD untuk bekerja selama '25 jam sehari dan lapan hari seminggu'. Kefahaman sebegini yang tertanam dalam benak setiap individu telah melahirkan satu

<sup>3</sup> Semasa itu ancaman pengganas komunis masih berleluasa terutama di sempadan Malaysia-Thailand.

budaya kerja yang cukup penting tanpa memikirkan imbuhan dan ganjaran walaupun bertugas di luar waktu kerja.

Dalam pembinaan projek-projek mega di Malaysia yang menyaksikan kerja-kerja dibuat mengikut syif oleh pekerja-pekerja kontrak, terup RAJD juga bekerja di waktu malam dengan bantuan cahaya lampu gasolin bagi menyiapkan kerja-kerja konkrit semasa membina Wisma Perwira Kem Gubir di sekitar awal tahun 1980an. Terup RAJD juga melaksanakan kerja-kerja kimpalan di waktu malam semasa membina rakit gergasi bagi OP Pemindahan Gajah di Tasik Banding. Tidak ada batasan masa bekerja sama ada siang atau malam walaupun tanpa wang atau elau kerja lebih masa tetapi semata-mata di atas keperluan setiap misi mesti selesai dilaksanakan.

**\* Pendekatan Mesra Masyarakat.** Pada kebiasaannya terup RAJD melaksanakan projek-projek di kawasan pendalaman atau kawasan luar bandar terutama di kawasan sempadan. Projek Jiwa Murni adalah sebahagian daripada strategi KESBAN kerajaan untuk memenangi hati rakyat dalam menentang ancaman pengganas komunis satu ketika dulu. Namun strategi tersebut tidak akan berkesan sekiranya terup yang melaksanakan tugas projek gagal memenangi hati rakyat setempat dan mereka sukar untuk bekerjasama dengan tentera. Pernah satu ketika, pasukan Infantri yang beroperasi di sekitar perkampungan berhampiran kawasan sempadan Malaysia Thailand telah diserang hendap oleh pengganas komunis. Namun terup RAJD yang berada di sana tidak diusik dan dipercayai akan menimbulkan kemarahan orang kampung marah sekiranya *bandit* mengacau atau menyerang anggota RAJD yang membina jalan, jambatan dan rumah untuk perkampungan mereka.

Mengambil kesempatan atas nama Projek Jiwa Murni, pendekatan mesra rakyat yang telah diambil adalah dengan menawarkan pakej bantuan dan perkhidmatan yang lengkap seperti membawa guru agama pasukan memberi slot ceramah di masjid dan surau mereka, mengadakan acara hiburan dengan membawa

kumpulan muzik/band pasukan ke kampung mereka atau setidak-tidaknya mengadakan aktiviti sukan yang melibatkan masyarakat setempat. Malah penguasa-penguasa tempatan seperti penghulu, ketua balai polis termasuk ketua-ketua masyarakat perlu dimaklumkan mengenai kehadiran terup RAJD dalam kawasan mereka. Pakej yang lengkap ini akan memartabatkan lagi TD amnya dan RAJD khasnya di kaca mata masyarakat. Hubungan baik yang dijalankan di antara terup RAJD dengan penduduk kampung mencetuskan suasana yang harmoni dan cukup positif sehingga adalah perkara biasa bagi anggota mendapat calon isteri di kawasan projek. Siapa sangka jodoh anggota yang berasal dari Melaka ada di Pulau Redang. Seterusnya timbul slogan satira di kalangan anggota RAJD iaitu jika batalion infantri berslogarkan *Satu Peluru Satu Musuh* manakala skuadron RAJD pula adalah *Satu Projek Satu Menantu*.

## FAKTOR KEPIMPINAN PENGURUSAN PROJEK JURUTERA

Terdapat tiga peringkat yang dihadapi oleh setiap pegawai sappers apabila ditugaskan untuk mengendalikan projek.

**\* Peringkat Pertama - Perancangan Awal Projek.** Aktiviti-aktiviti yang dilakukan meliputi tinjauan dan penulisan laporan tinjauan. Penulisan laporan akan mengambilkira aspek pentadbiran, tenaga kerja, peralatan kerja, kenderaan dan jentera loji yang terbabit dalam tugas projek. Ianya juga akan memperincikan hubungan dan koordinasi dengan pihak kedua seperti penghulu dan ketua balai polis bagi perkara-perkara keselamatan dan sosial termasuk agensi kerajaan yang lain dan pembekal bagi perolehan bahan bina projek. Pembentangan skop kerja yang menjadi intipati kepada laporan tersebut akan memaklumkan mengenai kerja-kerja yang perlu dalam perlaksanaan projek. Pada kebiasaannya laporan tersebut kena *pancung* sekurang-kurangnya dua kali oleh Pegawai Pemerintah sebelum diluluskan kerana fakta tidak lengkap, masalah SD atau *poor presentation*.

**\* Peringkat Kedua - Perlaksanaan Projek.** D Day, konvoi terup bergerak ke kawasan projek dan terup tersebut dikira berjaya melepas ujian awal sekiranya anggota dan kenderaan termasuk jentera loji semua selamat sampai ke destinasi tanpa mendapat kemalangan atau kerosakan. Kerja-kerja akan dimulakan sebaik sahaja penempatan dan pejabat tapak projek disiapkan. Di sinilah cabaran sebenar pengurusan projek akan bermula apabila kenderaan dan jentera loji mulai mengalami kerosakan. Satu perkara yang paling ketara di mana jentera loji adalah paling *vulnerable* semasa melakukan kerja-kerja tanah disebabkan *transmission hose line* bocor. Kebocoran mudah berlaku terutama kepada jentera loji yang jarang digunakan tetapi bekerja ke tahap maksimum di kawasan projek. Di samping itu juga ialah masalah alat ganti lambat tiba., kekurangan anggota kerana anggota bercuti, berkursus atau sakit dan masalah cuaca buruk. Terdapat juga projek yang mendapat publisiti yang luas dan mendapat tumpuan ramai pihak yang boleh mengakibatkan kerja-kerja projek sedikit terganggu disebabkan banyak siri taklimat terpaksa disampaikan terutama kepada tetamu kenamaan. Berdepan dengan cabaran-cabaran tadi, ketua projek perlu mengambil tindakan-tindakan yang bersesuaian bagi menentukan kelancaran projek yang dipertanggung-jawabkan.

**\* Peringkat Ketiga - Tamat Projek.** Sebaik sahaja projek tamat dan terup kembali ke pasukan, di antara tugas ketua projek adalah menulis laporan tamat projek dan membuat rutin pentadbiran. Di antara aktiviti lain adalah penyemakan stor dan peralatan serta pemulangan peralatan pinjaman dan adakalanya terlibat dengan majlis serah menyerah projek. Namun perkara penting yang menjadi kerisauan ketua projek adalah sekiranya berlaku gejala sosial yang berada di luar kuasa beliau yang terjadi semasa projek masih dilaksanakan tetapi ianya timbul menjadi satu isu setelah projek tamat. Kes-kes yang biasa terjadi adalah seperti anggota terup yang mempunyai hutang-piutang dengan peniaga tempatan atau orang-orang kampung termasuk kes-kes hubungan sulit dengan wanita tempatan. Bagi seseorang ketua projek,

biasanya tempoh bertenang adalah dalam masa tiga bulan dan dianggap bebas daripada masalah sekiranya tiada sebarang aduan diterima dalam tempoh tersebut.

Secara ringkasnya, terdapat tiga elemen yang seharusnya diberi perhatian oleh setiap ketua projek semasa mengendalikan projek:

**\* Elemen Pertama - Anggota Terup Projek.** Merancang keutamaan kerja dan memberi arahan kerja yang jelas kepada anggota projek serta memberi bimbingan dan dorongan untuk bekerja sebagai satu pasukan di samping mengambil berat aspek pentadbiran, kebajikan serta penjagaan moral mereka.

**\* Elemen Kedua - Agensi Luar.** Menjalin hubungan yang baik dengan staf formasi atasan, pasukan sahabat, pemimpin masyarakat setempat dan pihak media. Bekerjasama dengan pihak berkuasa awam dan agensi-agensi luar yang ada hubungkait dengan projek yang dilaksanakan terutama membabitkan aspek perundangan dan birokrasi.

**\* Elemen Ketiga - Pencapaian Projek.** Memenuhi keperluan semua pihak yang mempunyai kepentingan dalam projek sama ada pemohon atau pasukan atau markas atasan. Adalah penting untuk menghasilkan produk akhir projek dengan peruntukan yang diberi, mutu binaan projek yang kemas, menepati rekabentuk asal atau membuat pindaan dengan persetujuan pihak terbabit dan membuat semua bayaran yang perlu serta menyelesaikan aspek kewangan.

Dalam mengatasi kekangan dan cabaran semasa perlaksanaan projek, faktor kepimpinan seseorang ketua adalah merupakan faktor paling utama. Jatuh bangun dan baik buruk perjalanan projek bergantung sepenuhnya kepada beliau. Usaha, inisiatif dan kreativiti beliaulah yang menentukan kelancaran perjalanan projek. Tanpa menafikan faktor peralatan dan jentera turut memberi sumbangan yang besar, tetapi hakikat modal insan masih menjadi perkara mutlak sebagaimana pepatah Inggeris ‘*The man behind the gun is more important than the gun itself*’.

Di samping tugas hakiki sebagai pemimpin tentera, selaku ketua projek beliau seharusnya mempunyai wawasan yang tersendiri mengenai projek yang bakal dilaksanakan dan seterusnya melakar strategi bagi mengambil pendekatan-pendekatan yang bersesuaian dalam melaksanakan tugas tersebut. Beliau juga perlu bertindak sebagai jurulatih yang membimbing anggota-anggota bawahan terutama sekiranya perlaksanaan projek tersebut begitu kompleks. Paling akhir bertindak sebagai agen perubahan yang sentiasa inovatif dalam rekabentuk projek dan dapat melaksanakan projek secara tidak terikat dengan kaedah tradisional sebaliknya mampu memperkenalkan kaedah paling efektif dan efisien.

## PENUTUP

Sebagai salah satu daripada agensi perlaksanaan projek yang terdapat di dalam TD, sejarah penglibatan RAJD dalam tugas projek sama ada semasa perang atau aman, bencana alam dan kekacauan awam adalah begitu terserlah sejak ditubuhkan. Status sebagai sebuah organisasi yang tidak membuat keuntungan, melihat RAJD memberi sumbangan yang begitu besar kepada masyarakat terutama untuk golongan yang kurang bernasib baik. Malah penglibatan RAJD dalam pembinaan projek-projek di peringkat nasional turut memberi sumbangan yang besar dalam membantu agenda pembangunan negara.

Terdapat pelbagai kekangan dan cabaran yang terpaksa dihadapi oleh terup-terup RAJD dalam melaksanakan projek-projek yang dipertanggungjawabkan. Masalah kelewatan menyiapkan projek dan mutu binaan yang rendah adalah di antara faktor yang menggambarkan terdapat kelemahan dalam pengurusan projek. Ironi punca kekangan dan cabaran mempunyai kaitan dengan budaya pengurusan yang lemah dan tidak berdaya saing walaupun terdapat pelbagai dasar dan polisi serta peraturan berhubung dengan perlaksanaan projek. Namun selaku organisasi yang berteraskan disiplin dan *mission oriented*, aspek *damage control* mempunyai ruang penambahbaikan yang luas dan agak mudah untuk diadaptasi sekiranya seseorang ketua projek dapat mengenalpasti punca masalah dan bertindak untuk menyelesaikannya sepantas mungkin.

Secara umumnya dalam Pengurusan Projek Jurutera tidak timbul masalah besar berhubung dengan laporan tinjauan atau CPM atau S Curve atau lain-lain perkara teknikal tetapi lebih mirip kepada kelemahan *affirmative action*. Kegagalan untuk merancang, membimbing dan mengawas dalam konotasi perlaksanaan adalah penyebab utama perjalanan pengurusan projek tidak begitu lancar. Justeru keprihatinan setiap pemerintah dalam mengurus projek-projek yang dipertanggungjawabkan kepada pasukan mereka adalah penting terutama berhubung dengan aspek perancangan awal. Walau bagaimanapun ketua projek merupakan individu yang paling penting kerana dilantik dan diamanahkan mengetuai projek tersebut serta bertanggungjawab secara langsung ke atasnya. Dalam perkara ini soal pendekatan kerja dan keperibadian ketua projek akan menentukan haluan projek itu dibawa. Mereka yang mengambil pendekatan agresif dan mempunyai usaha yang lebih berpeluang untuk menikmati kejayaan. Mereka yang cakna kepada perubahan dan keperluan serta mampu bertindak dalam masa yang sesuai akan dapat mengatasi segala rintangan.

Napoleon menyifatkan seseorang pemimpin dengan ungkapan *leader is a dealer of hope*<sup>4</sup>. Dalam hal ini ketua projek juga adalah seorang pedagang harapan, di mana pegawai atasan menyandarkan harapan kepada beliau sebelum projek bermula, anggota bawahan mengharapkan pimpinan yang terbaik semasa projek sedang berjalan dan sesudah selesai perlaksanaan projek, pengguna pula mengharapkan kualiti projek yang terbaik. Seumpama dalam perjuangan di medan perang, ketua projek perlu memiliki kebolehan untuk memimpin seluruh anggota dalam menggarnit impian yang diharapkan. Perkiraan keadaan yang tepat tentang fakta masa, penggunaan terup, peralatan kerja dan faktor cuaca bakal menentukan haluan perlaksanaan projek ke arah kejayaan. Bagi meneruskan cabaran RAJD di hari-hari yang mendatang, kelibat seorang ketua projek yang mempunyai jati diri yang kukuh dan memiliki sifat serta perwatakan *Engineer in mind and Infantry at heart* masih menjadi sandaran dan tetap relevan sejak dulu, kini dan selamanya.

<sup>4</sup> Matthews, Lloyd J. & Brown, Dale E. The Challenge of Military Leadership. Virginia: Pergamon-Braseys, 1989. P.23

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Mej Wan Ahmad Zamri bin Abdullah telah ditauliahkan ke dalam Rejimen Askar Jurutera DiRaja pada Mei 1982. Sepanjang perkhidmatan selama 25 tahun di dalam Angkatan Tentera Malaysia, di antara jawatan yang telah disandang adalah sebagai pemerintah di peringkat terup dan Skuadron RAJD, Jurulatih di MTD, ATMA dan IKEM, Pegawai Staf 2 Latih Jabatan Arah Jurutera dan terkini sebagai Pegawai Staf 2 Tek di MK RAJD (SP). Beliau juga pernah bertugas sebagai Pegawai Pemerhati dalam misi PBB UNIKOM di Iraq/Kuwait.